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HAWAII COUNTY IN 1979

A Report by the Research Division *September, 1979*

In 1979 Hawaii County is achieving another year of substantial economic growth. The Big Island's economic turnaround began in 1978, led by sharp gains in tourism. This year started off with a surge unmatched in any year as the strong visitor flow continued to gain momentum, but the United Airlines strike through April and May and the grounding of DC-10 aircraft in June choked second-quarter visitor arrivals, affecting hotels and other businesses serving the visitor industry. However, the impact on the county's overall economy was less than was expected—tax collections were up 18 percent through July, bank debits to demand deposits (which reflect spending in the community) had increased 23 percent, total jobs fell only slightly in June, and the unemployment rate was lower than last year's.

One reason for the strength of the Big Island economy in the face of the crippling air transportation interruptions is that economic activities have developed to the point where an adverse impact on one is somewhat cushioned by others. Hawaii County has come a long way since Statehood. In 1959 the Big Island was primarily a sugar economy, but in the two decades since, tourism has overtaken sugar in importance, diversified agriculture has become a major prop of the economy, and science-energy research has developed dramatically.

Until last year the Big Island economy was only simmering. Now it's getting up to full steam. The groundwork done by the State, County, and private enterprise—the planning, the construction of roads, airports, and hotels, the promotion of the island as a visitor destination, and the encouragement of scientific activities and agriculture—are finally showing results. In 1978 the Big Island hosted 909,000 visitors—a gain of 8.3 percent—whose spending advanced 20 percent to $158 million. Sugar grossed $107.4 million for the year. Sales from diversified agriculture (which includes papayas, macadamias, flowers, cattle, coffee, etc.) increased 20 percent to $54.3 million. In science and technology, grants and federal aid received for work on the Big Island have amounted to tens of millions of dollars, and the flow is expected to increase as the nation uses the Big Island as a major laboratory to develop alternate sources of energy.

Construction, propelled to a large extent by tourism, had a strong year in 1978 with total private and government building authorizations amounting to slightly over $100 million, a gain of 28.6 percent over 1977. The gain was especially strong in the private residential sector where dollar volume totaled $61 million, 54 percent more than in 1977. This sector continues to show solid gains this year with first seven-month permits totaling $48 million, up 36 percent over the similar period last year. New condominium projects for the hot real estate market in Keauhou-Kona are causing the increase. The private nonresidential sector, boosted by construction of a $2.8 million shopping center in Hilo, had a first-seven-month permit volume of $11.8 million, 67 percent more than the same period in 1978. Last year was a flat year for government construction with $26 million in contracts awarded, the same as in 1977. But through August of this year, government contracts are up 124 percent. With tourism-related construction expected to increase in volume over the next few years, and energy-related projects to add to that volume, the construction industry appears headed into a boom period.

Overall, the well-diversified economy of the Big Island will weather the decline in growth of tourism this year adequately, and sugar should end the year in slightly better shape than last year. In all the county should have an even better year than last.

SCIENCE AND ENERGY RESEARCH

Scientific research has been well established on the Big Island for years, with volcanology on Mauna Loa since 1912 and meteorology and cloud physics studies in more recent years. On Mauna Kea astronomy now represents a capital investment of more than $60 million, and generates $7 million a year in supplies and payrolls for operation of four major and two smaller telescopes. It is the largest installation in the world in terms of reflecting glass. The University of Hawaii has one 88-inch and two 24-inch telescopes, and also operates NASA's 120-inch infrared telescope. The United Kingdom's infrared unit has a 150-inch mirror, and the Canada-France-Hawaii telescope, which will be dedicated in late September, has a 144-inch mirror. Mauna Kea's elevation and clear atmosphere make its summit the best place in the world for astronomical observations, and the Japanese and Austrian governments are also interested in building telescopes there.

Research that has captured the most attention lately is in the field of alternative energy projects. A breakthrough in ocean thermal energy conversion (OTEC) research was achieved on August 2 this year when the Mini-OTEC barge anchored a mile and a half off Keahole Point generated power for the first time, utilizing the difference in temperature between the warm surface water and the cold water pumped from the depths to run the generator. Of the 50 kilowatts of power generated in the six-hour test, 40 kilowatts were required to run all of the equipment aboard, and 10 kilowatts were excess power. Later it provided power on a sustained basis for more than 48 hours. Dillingham Corp., Lockheed Missiles and Space Co., Alfa-Laval Thermal Inc. of Sweden, the State, and the County of Hawaii were involved in this project. Officials viewed the result as being equivalent to landing on the moon, and their enthusiasm was understandable. A larger OTEC plant would require as little as 25 percent of the power generated for its own operation, leaving 75 percent excess for sale or other use. The capital cost of an OTEC plant would be tremendously high compared to a conventional oil-fired plant, but the advantage of an OTEC plant is that once construction is funded, there are no costs except for labor (minimal) and maintenance (uncertain). Fuel is cost-free. Mini-OTEC will continue to collect data until the end of the year, and may be involved in another data-collection project next year.

The Department of Energy has approved $42.7 million for a more extensive study, the OTEC-1 project, which will test heat exchangers aboard another craft and collect data for a three-

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year period beginning next year. Global Marine Development Co. of California has the contract for OTEC-1.

The Department of Energy will also provide the major part of the funding for the $9.3 million Seacoast Test Facility at Keahole, which is now in the planning and design stages. This would be an ocean study laboratory which could be used not only for OTEC data but also for studying the biomass potentials of kelp and seaweed, feasibility of using nutrient-rich water from the deep ocean for mariculture, and so on.

Tests of the geothermal well drilled in Puna in 1976 by the University of Hawaii have proven sustained yields of high pressure steam, and the Department of Energy is funding most of the $6.8 million cost for construction of a three-megawatt wellhead generator as a demonstration project. Construction has been delayed because the casing of the well (which was drilled for exploratory purposes rather than as a producing well) has crumbled in places and must be repaired. The estimated completion date for the generator is September 1980.

Geothermal power is such a vast resource that it will not be developed unless there is a big market to use it. A recent federally-funded study of using geothermal steam at Amfac's Puna Sugar Co. plant concluded that it would be technically possible and economically feasible to transport the steam by a 16-mile pipeline from the Puna rift zone to Keaau, to use in sugar processing and power generation. Benefits over a 20-year period could include tripling power sales by Puna Sugar to Hawaii Electric Light Co., savings to the mill of more than $20 million in fuel oil costs, recovery of sulfur dioxide worth $5.2 million from the geothermal steam, and savings to the public of $71 million from maintaining a lower rate for electricity. However, the wells and pipeline would cost $21 million and the report suggests that the State alone or in partnership with others should build the energy corridor and consider other uses for this resource such as an industrial park powered by geothermal steam. Dillingham Corp. and Amfac are doing a study on a theoretical site along the theoretical steam pipeline to see whether an industrial park project might be economically feasible. Uses for the steam could include manganese nodule processing, macadamia nut or fruit processing, and slaughterhouse operations.

C. Brewer & Co.'s silviculture (i.e., forestry) program is another effort funded by the federal government in seeking new sources of energy. Over a five-year period, Brewer is going to plant about 850 acres of different varieties of eucalyptus trees to determine which will provide the most fuel. Records will be kept on species of trees planted, spacing used between trees, nutrient requirements, cultural practices, and other factors, to see how the highest BTU content per acre can be attained. Brewer's nursery at Wainaku will produce 400,000 seedlings annually, for planting close to 2,000 trees per acre. Eucalyptus trees grow about a foot a month. In five to seven years the different plots can be harvested to get yield data and to test fuel content by using the chipped wood as fuel in the boilers at Pepeekeo and Ka'u sugar mills. It is estimated that roughly 120 tons of green trees can be produced per acre in five years. When the trees are turned into bone-dry material ready for burning, only 60 tons of weight will remain. This will be equivalent to 120 barrels of oil. Brewer has 40,000 acres of land that is marginal for crops but good enough for trees. If the desired yield can be achieved on this much land, an annual cutting program could yield millions of dollars in oil replacement.

Meanwhile, energy from biomass is a present reality on the Big Island—roughly a third of the Big Island's electric power is now produced by burning bagasse and sugar cane trash in the sugar mills. Mill equipment has been vastly improved in recent years to replace greater amounts of fuel oil with sugar cane waste, to process sugar and to provide greater amounts of surplus power to the Hawaii Electric Light Co. With this increasing source of power and with other energy prospects, the utility is getting further and further from committing itself to a new generating plant. It is highly possible that it will never build another oil-fired generator.

TOURISM

The Big Island visitor industry enjoyed its best year ever in 1978 as years of promotion began to pay off and people started coming in greater numbers. Total westbound visitors numbered 908,983, an increase of 8.3 percent over 1977. Length of stay was the highest yet, helping boost the average occupancy rate to 65 percent for the year, way above rates established the past several years. Visitor expenditures reached $158 million, $27 million or 20 percent more than in 1977.

The strong visitor flow continued through the first quarter of 1979, and industry officials had visions of the island's first million-visitor year. But the United Airlines strike and grounding of the DC-10s in the second quarter put the million-visitor goal out of reach for this year. Group incentive tours and conventions that had been scheduled on the Big Island were forced to cancel when transportation was interrupted, and occupancy rates plummeted in April, May, and June. Air transportation returned to more normal schedules in mid-July, and hotels recovered rapidly, making August a good month. Barring an adverse impact from a slowing of the national economy, the industry is expected to finish the year with moderate gains over last year.

The Big Island visitor industry will get a boost next month when the American Association of Travel Writers holds its annual conference for nine days on the island, with up to 400 expected from across the country. Their visit should result in some good articles publicizing the island's attractions.

A promotion called the "Other Hawaii" program started this month. It will tout the Hilo gateway, hoping to persuade those who want to visit only Hawaii, Maui, or Molokai to come via Hilo. United Airlines, which will be the only transpacific carrier providing daily service to Hilo when Continental suspends service in January, will put up two-thirds of the $300,000 promotion package, with Hawaii County, the Maui County Visitor Association, Aloha Airlines, and Hawaiian Airlines contributing $25,000 each.

The Big Island has a hotel inventory of some 6,100 units now, two-thirds of them on the leeward side. The gap will widen as resort development in the next few years will be concentrated on the leeward side, basically in the Kona and Kohala coast areas.

Kamehameha Development Corporation's Keauhou resort is enjoying a lot of activity. Four condominium projects are under construction now—the 62-unit first increment of Kanaloa at Keauhou, the 117-unit second increment of Keauhou Surf and Racquet Club, the 48-unit first increment of Keauhou Punahele, and the 112-unit first increment of Keauhou Gardens. The corporation has applied to the State Land Use Commission for reclassification of 880 acres from agricultural to urban use in order to expand its resort community mauka toward Kuakini Highway. The proposed expansion will be accomplished in three steps over 15 years. The first parcel of 363 acres would include the building of a second golf course and additional residential construction. In all, 1,350 residential units are proposed for the three parcels. Development of this new area would double the size of the Keauhou resort community as there are approximately 800 acres in the existing development.

Growth will shift to the South Kohala coast in the 1980s, when water becomes available and construction of resort-type projects begins. Lack of water has delayed development of resort communities at Mauna Loa Land Co. and Olohana Corporation properties. A test well at Lalamilo found ample water and now the State is drilling two more wells to supply the Kohala coast resort areas. The two companies will amortize two million dollars in bonds that the County floated to build a 12-inch transmission line from the wells to the coast. The wells and delivery system are expected to be completed around mid-1981. Olohana is planning a second golf course which will stretch on both sides of the highway and will be connected by an underpass. Employee housing is also being planned. Condominium apartments, and possibly another hotel of Mauna Kea Beach

quality, will be built. The Mauna Kea Beach Hotel, now owned by Western International Hotels, will add 100 rooms with more public areas. Mauna Loa Land's first golf course is partially completed. It should be finished by mid-1980, and will use brackish water for irrigation. Construction of the clubhouse will begin next year, and the golf course is scheduled to be opened in June 1981, when water becomes available. The first hotel of 400 to 450 rooms and a condominium apartment of up to 100 rooms are scheduled to be opened in 1982.

Waikoloa, which was purchased by Transcontinental Development Co. in January from Boise Cascade Corporation, has its own water supply and development can proceed as soon as the new owners are ready. Plans are to develop the resort-zoned land around Anaehoomalu Bay in two phases. The first phase includes the land by the bay where there is sufficient acreage for a golf course, six hotel sites, and 12 condominium apartment sites. The second phase will include the remaining acreage up to Queen Kaahumanu Highway. Up in the village area, all lots developed have been sold, 160 homes are completed, and 30 more are under construction. A 38-unit condo has been completed, and two condo projects of 24 and 104 units are under construction. All units have been sold, at prices ranging from $110,000 to $190,000. Further increments are planned.

The Kona Village is also under new ownership, having been purchased from Signal Properties by Cambridge Properties Inc. of Canada. The hideaway thatched-roof village is being expanded to 100 units, and Cambridge Properties is planning on building two more isolated villages of single cottages along the coastline between the present village and Kukio Beach to the south, with condominium apartments north of the village. In all 400 units are being planned, with each village to have from 100 to 125 units. Detailed planning for the first village will begin next year. Also being planned are 500 five-acre agricultural lots, some to be sold in fee and the remainder to be leased. The first phase will have 200 lots.

AGRICULTURE

Agricultural revenues at the farm level showed a large increase in 1978 as Big Island farmers enjoyed a good year after two years of declining sales. The two poor years were marked by depressed prices for sugar, and the gain last year was largely a result of better sugar prices. Diversified crops and livestock also reported large gains, contributing $9.8 million of the $26.5 million gain in total farm revenues. Farm sales totaled $122.9 million last year, 27.5 percent over revenues of $96.4 million in 1977. Unprocessed sugar cane brought growers a 32.2 percent gain, amounting to $16.7 million. The increase was made possible by greater production and better prices.

Diversified agriculture had a record performance, increasing revenues by 24.7 percent to $54.3 million last year. This was a jump from $43.6 million in 1977. Livestock sales jumped 29.5 percent to $20.2 million while diversified crops brought farmers $34.1 million, a gain of 18.1 percent. The gain in livestock sales stemmed almost entirely from the cattle sector where sales rose 39.3 percent. The higher diversified crop sales were accounted for mainly by macadamia nuts, flowers and nursery products, vegetables, and papaya. Coffee receipts were down 33.9 percent to $2.1 million due to smaller acreage harvested, poorer yields, and lower prices. Farmers received an average $1.16 a pound for their crop, down from a high of $1.85 a pound in 1976. Declining prices have forced some farmers to reduce fertilization, resulting in lower yields.

The projects funded by the Kohala Task Force are failing except for two. Pacific Hay Co. and Kulawai Plastics are in bankruptcy. Hawaii Biogenics has been under court-supervised reorganization, and the trustee is seeking a buyer. Kohala Nursery is reportedly operating profitably, and Orchids Pacifica has increased its sales and regained some financial strength. Meanwhile, two companies have signed leases with the Kohala Corporation and will start growing prawns in Kohala. Big Island Prawns Inc. has 90 acres for its operation, and Kona Aquatic Farms Inc. has leased 16 acres.

Sugar

The sugar industry on the Big Island harvested a larger crop in 1978, and production is expected to improve further this year. Last year's harvest amounted to 387,459 tons, almost 14,000 tons more than in 1977. This was the best gain tonnagewise of any island, although Oahu had a larger percentage increase. A further increase of 10,000 tons or so is expected in 1979, which would make it the best crop since 1971, not counting the production of Kohala Sugar Co. which terminated operations after the 1975 harvest. While sugar prices are still unsatisfactory, molasses prices have shot up this year because Brazil is withholding its molasses to make ethanol.

The larger crop last year was achieved by all plantations except for Hilo Coast Processing Co. (HCPC). Both increased yield and larger acreage harvested were responsible for the good production. HCPC was beset with bad weather and transportation problems, and milling was adversely affected by mud from the fields. Improvements in the field and mill resulted in a good year for the Davies plantations—Honokaa Sugar Co. and Laupahoehoe Sugar Co., which now have been merged to form the Davies Hamakua Sugar Co., whose 35,000 acres of planted cane is the second largest in Hawaii next to Hawaiian Commercial and Sugar Co. on Maui. Davies Hamakua produced 161,560 tons of sugar last year, an increase of more than 12,000 tons from 1977. The combined yield came to 11.14 tons of sugar per acre, which was among the best in the state. That's a remarkable achievement for a plantation that is mostly unirrigated. Two years ago yield was around 9.5 tons of sugar per acre. The company credits a competent work force, good cane varieties, and improved fertilization and herbicidal programs as the reasons for higher production.

HCPC, a cooperative owned by Mauna Kea Sugar Co. and several hundred independent cane growers, has plowed through several years of adversity and appears to be pulling out of its problems. Extremely heavy rainfalls last winter washed out roads that will cost the growers a million dollars to repair. The closing down of all satellite mills left the Pepeekeo mill processing all of the cane from 25,000 acres of fields. The long distances and frequent rainy weather made it difficult to keep the mill supplied with cane at all times and harvesting fell behind schedule. The company has added more trucks and this problem has been resolved. A cane wash plant was installed in the mill and the milling was modified to capture the short pieces of cane that were lost in the past. In addition, HCPC began using the ripening agent on the cane of the small growers. The latter two changes have increased yield by about a ton of sugar per acre to more than 10 tons per acre. The company feels that the factory is no longer a limiting factor in production. The big problem remaining for HCPC and the industry is depressed prices for sugar. This is particularly painful for HCPC because many of its smaller grower members are groaning under the weight of three years of below-cost returns for their sugar. Many have given up, and the company is attempting to hold the remaining growers together until help arrives from Congress. There were 400 independent growers in the cooperative in the beginning. The number had slipped to 350 at the beginning of this year, and at midyear had declined further to 322. The State Legislature earmarked another $1.2 million this year for loans to small cane growers. But ultimately they will need better prices if they are to continue to grow sugar.

Davies Hamakua mills at Haina and Ookala, each with a 200-ton hourly grinding capacity, are getting good performance from new and improved equipment, put in place beginning 1976. Pollution control over the past several years has been very expensive, the latest investment being a $750,000 scrubber installed at Ookala to cut smoke pollutants. The investments that promise to pay most handsomely are the upgradings of the boilers at both mills. The Foster Wheeler boiler installed last year at Haina was designed for bagasse burning from boilers that Foster Wheeler builds for the Canadian forest products industry. The Haina and Ookala mills exported 9.4 million kilowatt-hours to the Hawaii Electric Light Co. last year. Davies

has plans to increase generating capacity at both mills if it can get a higher rate of return for the power it sells to the utility. To reduce requirements of fuel oil (which has increased 57 percent in price this year), Davies Hamakua mills have been grinding trash with the cane to increase fiber. Now Davies has announced that it will construct a $1.5 million bagasse-pelletizing plant, using a Bio-Solar Research and Development Co. process. The pelletized bagasse can be stored or shipped easily, and Davies may eventually sell its surplus although initially it will use the pellets in its own boilers. A ton of bagasse pellets will be the equivalent of two barrels of oil, and use of this by-product will help the company contain costs.

Hilo Coast Processing Co. is also depending on profitable sales of power to help take the pressure off rising operating costs. It is the largest exporter of power and provides Hawaii Electric Light Co. with 100 million kilowatts of power annually. In addition, it consumes 25 million kilowatts for its own operations. This operation is not profitable yet because it needs fuel oil to supplement bagasse as fuel. It started to incorporate trash into the milling process last year to increase fiber content, but this has had its disadvantages in raising the moisture content of the fuel and lowering juice quality. HCPC has been running 75 percent of the trash through the mill, and it is trying to increase it to 100 percent this year. Dewatering the trash by sending it through a separate mill would solve the moisture problem but it would be a heavy capital cost for the company. Bagasse has about 50 percent water, and every one percent reduction in moisture would increase the B.T.U. content sufficiently to reduce the fuel oil requirement by 2.3 percent. Power generation has been a losing proposition so far. Each year losses have been cut, but they will rise again with the steep increase in fuel oil prices this year. The company received a federal grant last month to study the feasibility of using solar energy for milling processes. If the outcome proves favorable, use of solar could go a long way in cutting down costs of operation and power generation.

Puna Sugar Co. had a 4.6 percent larger crop last year with production of 58,180 tons of sugar. But rainfall this year, which amounted to a normal year's precipitation in the first six months, will prevent the company from completing its harvest. The postponed harvest could give Puna a large crop next year, if weather is not as extreme as 1979's. Over the past several years, Puna has made vast improvements in its factory, with a new milling system, dewatering equipment, and a new boiler that is increasing its power output. As a result, Puna will increase its export of excess power into the Hawaii Electric Light system by 20 percent.

Ka'u Sugar Co. produced 57,573 tons of sugar in 1978, an increase of 3 percent over 1977. Production this year will increase further by about 2,000 tons. Ka'u has had some of the better yields in the state in the past few years. The Ka'u factory doesn't have the generating capacity to produce more power than for its own needs, although it has a lot of excess bagasse. The company is studying the situation to determine what can be done with the excess fuel. If generating capacity is not expanded, the plantation could ship the excess bagasse to Hilo Coast Processing Co. to reduce that company's fuel oil requirements.

Flowers and Nursery Products

The rapidly growing flower and nursery product sector of diversified agriculture advanced a notch in 1978 to become the state's third-ranking diversified product in terms of receipts. In overtaking vegetables, the flower and nursery product industry generated receipts totaling $17.5 million, an increase of 25 percent over 1977. The increase was accounted for by huge gains in the exports of anthuriums and potted foliage. Anthurium sales last year totaled $5 million at wholesale, up an amazing 49 percent, and sales of potted foliage increased 40 percent to $3.4 million.

Of total industry receipts, Big Island growers received $8.6 million, or almost half. Receipts were up 35 percent for the year and have more than doubled since 1975. Over the past decade, the Big Island has made the biggest gain in this sector. In 1969 Big Island receipts for flowers and nursery products amounted to $1.6 million, or 40 percent of the $3.9 million state total. The Big Island increased its share of total receipts substantially in the last three years when exports of anthuriums and potted foliage began their sharp climb. The Big Island sold 1.8 million dozen anthuriums last year of which 1.5 million dozen were exported—71 percent to foreign countries and the remainder to the Mainland. Receipts totaled $4.8 million, up from $3.2 million in 1977. West Germany, Italy, Japan, and Australia were the biggest foreign markets for these flowers. Potted foliage brought receipts of $1.4 million last year, compared to $1 million in 1977.

Despite the United Airlines strike and the grounding of the DC-10s, exports of anthuriums to foreign countries showed big gains in the first half of this year, totaling 552,000 dozen, a gain of 23 percent over the previous first half. Shipments to the Mainland, at 199,000 dozen, were virtually unchanged from the year before. The Big Island Anthurium Cooperative encountered more difficulty in shipments during the DC-10 grounding than during the UAL strike. A lot of rerouting was required, mainly by making alternate connections through Honolulu. The cooperative accounts for 15 to 20 percent of Big Island production, and its membership continues to grow after three years of operation. It sees some external impact pending for the industry in the next few years in the form of more competition from foreign growers and increased transportation costs, but hopes to better prepare the growers for these changes by getting more of them to join the cooperative.

Kohala Nursery and Amfac's nursery in Keaau are the major exporters of nursery products from the Big Island. The former uses both air and surface transportation to ship its products to the Mainland, but Amfac relies almost entirely on air freight. For that reason it had to reroute some of its shipments through Honolulu when air service was interrupted. Amfac has 45 acres under cultivation in Keaau and five acres of greenhouses on Oahu, used mainly for finishing plants. Despite the interruption of air transportation, shipments this year have increased substantially. Its exports are marketed almost entirely in California, but Amfac Nurseries is hoping to develop the Pacific Northwest market when volume permits.

Vegetables

Big Island farmers reported that total receipts for vegetables reached $5.6 million in 1978, a 14.6 percent increase over the $4.9 million in 1977 sales. This is the second consecutive year of substantial gains for vegetable crops. However, local production is not keeping pace with increasing local consumption. Last year the total market supply of fresh vegetables grown in Hawaii was 68.3 million pounds, almost 4 million pounds more than in 1977. But imports totaled 97.1 million pounds, an increase of 9 million pounds over 1977. Big Island farmers contributed about 40 percent of total state production, up slightly from 1977.

Big Island production of fresh vegetables is expected to increase further in the years just ahead. A major reason for this increase is the rapid expansion in greenhouse production of tomatoes and cucumbers in Glenwood by the Hawaii Koi Corp. At midyear the company had 26 acres of growing area under cover, and planned to expand this to 36 acres by year end. The company, incorporated five years ago, and its predecessor owner had been growing tomatoes in greenhouses for 16 years. But the big expansion came last year, and production is now up to 3.5 million pounds a year. Cucumbers were added in May following market testing that began last December. Production is up to 2,000 pounds a day and will be increased. The variety of cucumber grown is a hybrid developed in Holland, and it is doing very well in the Glenwood greenhouses. Tomato yield is 11 to 12 pounds per plant. The fruit is harvested for packing in three sizes and three stages of ripeness, to be shipped according to the specifications of buyers.

Hawaii Koi has integrated its operations by having its own

distribution system. Its route salesmen on the Big Island and Oahu deliver the produce to the markets and set up their own displays to assure consistent quality. Distribution on Maui and Kauai is handled by agents. Hawaii Koi has between 25 and 35 percent of the state tomato market, and captured 20 percent of the cucumber market within a month of introducing its new product. It is exporting produce both to Alaska and Canada. Two buildings—one for chilling, the other for fumigation—are being built so that the produce can be shipped to the Mainland beginning with Portland and Seattle later this year. The company feels that it can outsell its Mainland competitors even though it has to ship its produce a longer distance. A greenhouse in Ohio, for example, will annually consume $55,000 worth of energy to heat each acre under roof, but at the 2,700-foot elevation of Glenwood the energy requirements are nil except for a minimal amount of power needed to close or open a small vent in the roof during adverse weather conditions. The water system consists of a five-million-gallon reservoir fed by rainfall gathered from the greenhouse roofs, and delivered to the plants by drip irrigation. A great advantage Hawaii Koi has is the high quality of its produce. Revenues increased from $100,000 in 1976 to slightly over $1 million last year. This year receipts should be close to $2 million.

Cattle

Big Island ranchers sold a record 45,900 head of cattle last year, up from 1977 sales of 41,500 head. Average farm prices were up substantially last year, and total receipts reached a record $16 million compared to $11.5 million in 1977. Ranchers paid a price for the record sales, however. A severe drought in early 1978 forced them to send many animals to slaughter in order not to lose them, which reduced herd inventories drastically. At the beginning of this year, there were 119,900 head of cattle including calves on Big Island ranges, down from a high of 139,600 in 1976. It will take several years to rebuild the herds, and cattle marketings are down substantially this year as ranchers retain cows and heifers to produce more calves.

Weather has been generally good this year, and grass has been plentiful. But the aftereffects of the 1978 drought linger. Many heifers are not ready to conceive, and a smaller calf crop is expected. The calf crop could be much better next year if the good weather continues.

The average price for feedlot-finished beef last year was 42.8 cents a pound. Prices have climbed way above that level this year but leveled off in June. Despite another year of higher receipts, ranchers are experiencing steeply rising costs, mainly for fuel but also for materials and equipment.

Macadamia Nuts

The macadamia nut industry achieved its first over-20-million pound year, with a production of 21 million pounds for the crop year ended June 30, 1979. This was an increase of 6.6 percent over 1977-78 production of 19.7 million pounds. Despite drought, rainstorms, and diminished blossoms due to wind and rain, the record year was made possible by an additional 3,000 acres that reached the bearing stage last year. The total sales value of unhulled nuts reached $11.3 million, an increase of 40.6 percent over year-before sales of $8 million. The dramatic increase in revenues to growers was made possible by a sharp increase in prices, which averaged 53.8 cents a pound last year compared with 40.8 cents a pound the previous year. The county of Hawaii accounts for 99.6 percent of the state's production. However, this will change in the next few years as C. Brewer & Co. has started an orchard on Maui which should reach 2,000 acres in five years.

Harvesting has just started for the new crop year, and heavier production is expected because of better yields. Revenues to growers are also expected to climb substantially as prices keep rising, forced up by a supply that is still short of demand, despite production from foreign areas such as Kenya, South Africa, Fiji, and Australia. Some foreign-grown nuts were imported last year in order to fill orders that could not be accommodated with local production alone.

Another factor in increasing macadamia production results from improvements made in a large orchard in Honomalino. Gary Cadwallader purchased the Honomalino orchard from its previous owners in early 1977 and established his Mac Farms of Hawaii Inc. He has 3,300 acres of trees, all bearing. The previous owners had a lot of difficulty because of the dry conditions in South Kona, the rough terrain that made harvesting more labor-intensive, and the lack of labor. Mac Farms tended the orchard, went to mechanical harvesting with shaker equipment, and in two and a half years increased production some 400 percent. Mechanization has compensated for the labor shortage. Mac Farms has 35 full-time employees and adds from 50 to 60 during the harvest season. In the past, production was sold to one processor, but more customers are being added now.

Being the second largest macadamia nut grower in Hawaii, Mac Farms is beginning to integrate its operations and is building a husking plant this year. Next year it will build a cracking plant and then will be producing raw kernels. The company plans to add another 10 to 15 full-time employees when the husking and cracking plants are in operation, but finds it difficult to attract labor because of the lack of employee housing. It is starting a program of building a few houses a year to ease the shortage.

Mac Farms of Hawaii has no plans right now of integrating its operations further and going into manufactured products. There is enough work to be done in the production end. There are 600 acres of land below the highway that had been planted by the former owners but were later abandoned. If water is made available, the company will reclaim this orchard and bring it back into production. The State is drilling a test well in the area, and if water is found the company could double its acreage. It has another 2,500 acres of land that is suitable for macadamia nuts, which would increase the orchards to 6,400 acres.

Mauna Loa Macadamia Nut Corp., the state's largest grower, has started an expansion program that will add 5,000 acres by 1984. All of its acreage is on the Big Island now, but 2,000 acres of its expansion will be located on Maui northwest of Wailuku, replacing sugar cane. Mauna Loa's orchards in Keaau and Ka'u cover more than 4,200 acres and make up more than 40 percent of total state macadamia plantings. All of its orchards are producing now with the exception of the 160 acres planted in Ka'u this year as part of the expansion program.

The rainstorms in January and February in Ka'u followed by drought affected flowering of the trees which in turn will affect yield. But increased production is expected because trees in a new orchard have just reached the bearing stage. As the world's largest processor of macadamia nuts, Mauna Loa markets its nuts as roasted whole kernels and in a brittle. It will add one new manufactured product each year but the company intends to continue emphasis of roasted whole kernels.

At one time most of Hawaii's macadamia nuts were processed and sold as salted whole nuts. That has changed since Hawaiian Holiday Macadamia Nut Co. was purchased by Paul DeDomenico from Theo. H. Davies & Co. in late 1974. The company processes and markets nuts purchased from growers, and from the beginning has been new-product-oriented, stretching the short supply of nuts into a variety of products. Today 200 products are made in its factory in Honokaa, most of them with macadamia nuts as part of the ingredients. It is now going into some non-macadamia products, such as jam and coffee-based candy. The company is the second largest processor of macadamia nuts, and has the most integrated operations, selling about 90 percent of its products in its own retail stores. It has shops in Honokaa, Kailua-Kona, Lahaina, Honolulu, and Hong Kong.

Papaya

A series of disasters in the first half of the year will reduce the 1979 papaya crop by around 30 percent, and a shortage may continue for a year or more. Instead of the slight increase projected over the record 1978 crop of 54.6 million pounds of

fresh fruit, this year's crop is now estimated to reach only 38 million pounds.

The termination of Princess Orchards' operations on Maui this year was expected to be overcome by increased production on the Big Island, but misfortune struck growers in the Puna area. A new disease was discovered after the winter rains, which destroyed 300 acres of trees. And the Northwest Airlines strike early in the year reduced much needed airlift capacity. Warehousemen in California then went on strike, followed by a strike of independent truckers, which limited haul capacity inland. These incidents were followed by the United Airlines strike and the grounding of the DC-10s. The industry has a continuing problem in the lack of adequate air freight capacity to the Mainland. The reason that air transportation interruptions this year didn't have a greater impact was that production was already cut to the bone. For the first five months of this year, statewide production was down 34 percent from the same period last year. The harvest on the Big Island was off 40 percent, indicating the heavy damage in Puna, which grows the majority of the state's papaya. The Big Island shipped only nine million pounds of fruit in the five months compared with 15 million pounds last year. Where it exported 41 million pounds in all of 1978, this year's shipments are expected to amount to only about 26 million pounds. The biggest marketing cuts will be a 37 percent reduction in shipments to the Mainland and a 32 percent reduction to Honolulu. To ease the shortage in the Honolulu market, the industry has temporarily lowered the standards for quality and size. The reduced supply has sent prices skyrocketing, with average wholesale prices on the Mainland in the first half of the year ranging upward from 81 cents a pound, about 40 percent more than in 1978. Growers are expected to receive revenues of $5 million in the first half, slightly more than in last year's first half, but with production costs running 11 percent higher than last year their net will be lower.

Papaya puree, which had been manufactured almost entirely by Princess Orchards, will be produced now on the Big Island. Puna Papaya Co., the state's largest grower, purchased Princess Orchards' processing equipment, and the plant is just about ready to begin operations. Located in Keaau, it will process all of Puna Papaya's culls which amount to between five and six million pounds in normal years. The supply of papaya puree is low, and Puna Papaya will probably have to process other growers' rejects as well as its own if it is to supply the growing demand for puree. From 40 to 50 percent of the fruit is recovered for puree, and remaining rind and seed sold as feed to livestock producers. The puree is used mainly as a blend in various fruit drinks at the present time.

Puna Papaya could have been hurt badly by transportation difficulties this year. However, shipment to the West Coast by Matson ships, and transportation to inland points by the trucking fleet of its distributor, Calavo Growers, saved its precious short crop. Some growers were forced to use several transshipments to get their fruit to its destination.

Hawaii County Statistics

	unit	period	1974	1975	1976	1977	1978	7 mo.* 1979	% change 7 mo.* 1979/1978
Population, Resident	number	July 1	72,300	75,300	77,800	79,200	80,900p	N.A.	—
Per Capita Personal Income	dollars	total	5,146	5,579	5,760	6,266	N.A.	N.A.	—
Civilian Labor Force	number	mo. avg.	33,150	34,700	35,900	36,400	35,550	35,100p	−1.7
Employment	number	mo. avg.	29,900	31,250	31,850	33,050	31,950	31,850p	−0.2
Unemployment	number	mo. avg.	3,250	3,450	4,100	3,350	3,600	3,200p	−14.7
Unemployment Rate	percent	mo. avg.	9.8	9.9	11.4	9.2	10.2	9.2p	−13.2
Total Job Count[1]	number	mo. avg.	31,000	32,350	33,000	33,700	34,850	34,300p	0.3
Tax Collections	thous. $	total	42,173	49,487	53,550	54,709	63,231	40,166	18.8
Total Bank Deposits	thous. $	end per.	188,262	190,394	215,688	235,232	262,759	284,210	16.3
Debits to Demand Deposits	mil. $	total	1,357.8	1,485.8	1,856.5	1,754.3	2,009.5	1,395.1	22.9
Private Permits									
Residential	thous. $	total	49,995	38,698	29,243	39,505	60,963	47,781	35.9
Single Family	no. of units	total	839	826	821	1,070	1,382	857	2.6
Multi-Family	no. of units	total	994	511	129	133	334	384	99.0
Non-Residential	thous. $	total	23,920	11,018	10,505	11,850	13,408	11,779	66.6
Public Contracts Awarded	thous. $	total	34,842	41,576	38,656	26,884	26,263	18,085	18.8
Federal	thous. $	total	1,147	61	560	7,806	4,156	50	−97.8
State	thous. $	total	20,456	31,505	18,022	13,370	16,551	16,184	77.9
County	thous. $	total	13,239	10,009	20,074	5,708	5,556	1,850	−52.3
Estimated Westbound Visitors	thous.	total	742.8	769.8	816.5	839.0	910.0	524.0p	−0.9
Intended Length of Stay—Westbound	no. of days	mo. avg.	2.96	3.08	3.05	3.13	3.25	3.40p	4.6
Hotel Inventory	number	June	5,265	5,386	5,936	6,051	6,064	6,056	−0.1
Hotel Occupancy	percent	mo. avg.	61.2	59.9	57.6	61.0	65.0	64.6	−3.4
Telephones in Service	number	end per.	47,681	50,090	52,746	55,941	58,661	60,935	6.2
Motor Vehicle Registration	number	total	50,626	53,001	56,845	60,317	62,937	N.A.	—
Sugar Production, raw sugar 96°	thous. tons	total	390	412	388	374	387	192	−6.8
Diversified Agriculture[2]	mil. $	total	32.3	35.7	41.5	44.1	53.9	N.A.	—
Crops	mil. $	total	17.1	20.3	25.8	28.9	34.1	N.A.	—
Livestock[2]	mil. $	total	15.3	15.5	15.7	15.2	19.8	N.A.	—

p = preliminary
N.A. = not available

**except hotel inventory (June).*
[1]*Refers to number of jobs rather than number of persons employed. Persons with more than one job are counted more than once.*
[2]*Includes estimates for milk and chickens.*

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KAUAI COUNTY IN 1979

A Report by the Research Division

October, 1979

In 1979 Kauai County finds itself in the midst of growth more rapid than it has ever experienced in the past. Propelling the economy forward are tourism and construction, and this double-barrelled force is expected to accelerate the growth rate in the next year or two. The other sectors of Kauai's economy also appear encouraging. The sugar industry on the island is expected to make gains this year although the impact of past years' drought is still being felt. Diversified agriculture continues expanding, with increased production in papaya, guava, and seed corn. Aquaculture is making slower headway than earlier projected, as prawn production has been affected by unsuitable weather conditions. NASA has postponed its departure from Kauai, so the Kokee Tracking Station will be in operation until 1983 or beyond.

Kauai's economic health shows in key indicators. Labor statistics for the first eight months of 1979 indicate that employment has increased by 400, and the unemployment rate has dropped sharply. Hotel employment has shown the biggest gain, while increases have also been registered in other services, sugar, transportation, communications, and utilities. The value of private building permits and government contracts awarded through August this year has doubled from the same period last year. Tax collections for the first eight months of 1979 are up 16.6 percent, and the dollar volume of checks written has increased 22.3 percent.

Kauai's visitor industry growth accelerated last year, with westbound visitors increasing 13.1 percent. The strong growth rate continued into the early months of 1979, but the strike against United Airlines and the grounding of the DC-10s in the second quarter blunted the gain, holding the cumulative increase for the first seven months to 3.6 percent. A good recovery is expected for the remainder of the year.

On the construction scene, last year's dollar volume increased by 70 percent, with volume in the private sector more than doubling. For the first eight months of 1979 construction dollar volume in the private sector is up around 90 percent, while the value of government contracts has almost quadrupled. Consider the following: the number of condominium and hotel units authorized by building permits in the 16 months from January 1978 through April 1979 total more than all the units in existence at the end of 1977.

Contributing to the construction volume is the $25 million power generating project at Lihue Plantation. In addition, there are three new shopping center projects and one shopping center expansion in Kauai's future. The 53,000-square-foot shopping complex being developed by McDonald's of Hawaii Development Co. in Waipouli is ready to begin construction.

The largest project is a twin development at Puhi proposed by Grove Farm Co. The Grove Farm shopping center will have 307,000 square feet of leasable space, and the office-commercial complex adjoining the center will have 170,000 square feet of space. Ground-breaking is scheduled for early next year. Both projects will occupy 54 acres, excluding roads and rights of way. Eventual expansion of the shopping center and long-term development of single-family home lots and multi-family projects will cover 600 acres, most of which are in sugarcane at present. Grove Farm's share of the cost of the two commercial projects is estimated at $18 million. Certain major tenants will construct their own units.

A new shopping center for Lihue, with 134,000 square feet of space, is being planned by HRI Ltd. The center will be bounded by Wilcox Medical Center, Kuhio Highway and Airport Road. Construction is scheduled to begin after the sugarcane is harvested. In Hanalei, the Princeville Shopping Center will be doubled in size, with work scheduled to begin next year. The center has 26,000 square feet of space now.

The increased building activity is beginning to show up in larger real property tax collections for the County. That increase plus $385,000 in additional grants-in-aid from the State and $300,000 released from an escrow fund following settlement of real property tax appeals puts the County in better financial shape than it has been in many years. However, the County has not yet benefited fully from the increased construction because the State Tax Office is behind in its assessment work. The County is accepting this delay because real property tax administration and collection will be turned over to the counties in 1981. For calendar 1978, total tax collections were up 13 percent, but real property taxes were up less than 10 percent. For the first seven months of 1979, however, total taxes collected showed an increase of 21.5 percent and real property tax collections jumped 29.7 percent.

Despite the improvement, the County's resources are still too meager for it to expand and upgrade the islands' infrastructure to accommodate numerous new projects. Taking a cue from Maui County, the Kauai County Council is studying the idea of a formula under which developers would be assessed for a portion of the costs of the infrastructure, such as roadways, sewer system, water system, and so on. A formula method appears to be favored because it will give prospective developers a clearer idea of assessment costs while plans are being drawn up.

Until an ordinance is passed, the County is assessing developers on an informal basis, case by case. This authority is derived from the Conditional Zoning Ordinance, which is an amendment to the Comprehensive Zoning Ordinance passed two years ago. It allows an assessment of up to one percent of the total cost of the project to help pay for the necessary infrastructure. In the case of Moana Corp., which is developing the 486-acre Kiahuna Golf Village, the State Land Use Commission agreed to reclassify the land for the project on condition that the company develop and sell 140 low-cost leasehold lots to residents. The County instead negotiated a $2 million contribution

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for its housing program. The Land Use Commission agreed to consider the change on condition that all parties agreed to the plan, and that the funds would be earmarked solely for housing with a trust fund set up for that purpose. The Commission was to decide in mid-October between the 140 low-cost lots or the $2 million contribution to the County. Pacific Standard Life Insurance Co., which got rezoning approval on 25 of its 60 acres at the old Nukoli Dairy site to build a hotel and condominium units, will pay $500,000 in assessments. It will also have to satisfy 11 conditions including the installation of a water main and construction of acceleration and deceleration lanes on the highway approach to its property.

This new County program shifts some of the high cost of public facilities to the users, and also builds up a fund for lower-cost housing to benefit residents. Sharply accelerating real estate prices are putting housing out of the reach of many people, and a County program to provide housing is becoming a necessity if the expanding visitor industry is to have a labor pool close by to draw from in the future.

TOURISM

Kauai's visitor industry posted healthy gains in 1978 in both the number of visitors and the amount of their expenditures. The record increase of 97,211 visitors to the island brought the number of westbound arrivals to 837,712 last year. Expenditures climbed 25.6 percent to $138 million, more than double the $62 million in revenues generated by sugar. The productive year carried through into the first quarter of 1979, but the strike against United Airlines and the grounding of the DC-10s in the second quarter hurt the industry, especially condo occupancy rates. However, the strong first quarter adequately cushioned the second quarter dip, and the industry recovered firmly in the third quarter. The major hotel chains demonstrated a stability during the decline that prevented average occupancy for the island from plummeting, and employment held steady. In fact, Kauai hotel employment actually rose somewhat during the four months of air service interruptions.

The ascendancy of tourism the past few years and the difficulties confronting the sugar industry have combined to make the visitor industry the salient factor in Kauai's economy. Tourism has grown rapidly in the two decades since Statehood, with growth accelerating in the second decade. Visitor expenditures on Kauai were in the neighborhood of $8 million in 1959, and by 1969 they had grown to $38 million, which was still less than sugar revenues. By the end of this year, visitor expenditures will be approaching $150 million, more than twice what sugar will gross.

Despite the spectacular performance last year, the tourism boom on Kauai is just beginning if plans for construction of visitor accommodations are any indication. Kauai's visitor plant occupancy rate has been the highest in the state largely because hotel building has been dormant in the past few years. The industry needs more units to house the growing number of visitors. And build it will. The County Planning Department records show that there were 3,816 condominium and hotel units on the island at the end of 1977. In the year and four months that followed, the department approved 4,040 condominium and hotel units for construction, a doubling of units if all of them are built. There were 2,765 additional units in the planning stage at that time.

Construction of four new hotels and a major expansion of a fifth within the next three years will add 1,680 rooms to the present inventory of 2,894 hotel rooms on the island. In the same time frame, 1,410 condominium units are expected to be completed and added to the inventory of 1,170 condominium units in existence at the end of 1977.

Under construction now is the 158-room hotel in Poipu which together with the present 143-room Poipu Beach Hotel will become Island Holiday's Waiohai Resort Hotel. To be started early next year are the 300-room hotel that Consolidated Oil and Gas Corp. will build at its Princeville resort to be operated by the Marriott hotel chain, and the 240-room addition to the 170-room Sheraton Kauai Hotel. Ohbayashi Hawaii Corp. owns the hotel and will build the addition. Also scheduled to start next year is the 297-room hotel in Coconut Plantation by Pacific Holiday Inc. All four hotel projects above are scheduled for completion in 1981. The remaining project is the proposed hotel to be built on the old Nukoli Dairy site by Standard Life Insurance Co. The County rezoned 25 of its 60-acre tract to urban use, and a 350-room hotel and 150 condominium units are being planned. Standard Life must obtain two other permits and satisfy some conditions before it can start construction. The County estimates completion in 1982. In addition to these large projects, the 36-room addition to the 170-room Kauai Sands Hotel will be completed this year.

Condominium construction activity is expected to accelerate next year. The County estimates 655 condominium units will be completed this year. But in 1980, 1,360 units are scheduled for completion, more than half in the Poipu area. In 1981, 1,440 units are scheduled for completion, mainly in the Princeville, Lihue, Poipu, and Wailua areas.

Moana Corp., which recently got its 486-acre Golf Village site rezoned, will be one of the big developers of condominiums. Its first two projects, each to be built in two phases, will have 288 units in all. Construction will begin shortly. Work on the 50,000-square-foot shopping complex will begin next spring. Golf course construction will get underway before year-end, and the clubhouse will be started late next year with completion to coincide with the opening of the golf course in late 1981. Six courts will be added to its tennis complex for a total of 16, with 10 of them to be lighted. Moana Corp. has taken over the Plantation Gardens restaurant and is putting in a half million dollars worth of improvements.

Work has started on Poipu Kai, a 100-acre resort development of ADM International Ltd. that stretches from Brennecke Beach to Keamiloa Bay. The first phase of a two-increment condominium project of 82 and 73 units respectively, was started in August. The first phase of a second project with 52 and 58 units each will be started in November. A third condominium project of 72 units is being developed by a local group. ADM will also start work shortly on the first 47 lots of its Lanai Villas on a modified zero-lot-line concept that will allow more open space and landscaping. These single-family lots will average 6,500 square feet in size and will be sold as lots or with homes on them. All properties will be sold in fee simple. Plans for the remainder of the tract include extension of the Lanai Villas and more condominium projects overlooking Keamiloa Bay.

Hanalei Investment, Inc. is planning a 90-unit luxury condominium on the site of the Club Mediterranee in Hanalei, to replace 161 existing Club Med rooms. Construction could begin in the spring of 1980.

Consolidated Oil and Gas Corp. is getting ready to build its first hotel at the Princeville at Hanalei resort. If the remaining permits are approved as scheduled, construction will begin early next year, with the opening in the summer of 1981. The 300-room structure will be built on the hillside overlooking Hanalei Bay. The big activity at Princeville now is in condominiums. Four projects totaling 400 units are under construction now, and by the end of the year two more projects with 200 units will get underway. By the end of the year, 704 units—including 130 single family homes—will be in place. Three more projects are planned for next year, but beyond that Consolidated Oil must ask the State Land Use Commission to reclassify more land to urban use in order to expand the resort

community. There is sufficient zoned land, however, to build another 18-hole golf course which will be ready when the hotel is opened. In addition, the second phase of the shopping center will be started next year, which will double the leasable floor area.

ENERGY RESOURCES

One of the minor consolations of the steep oil price increases by the OPEC cartel is the improving economics of alternate energy generation, and Hawaii's sugar plantations are taking a hard look at that potential. The plantations have historically burned bagasse to generate energy for factory requirements. Excess power was sold on a dump basis to the local public utility. The energy crisis precipitated by the oil cartel in 1973 and 1974 spurred government to look at alternate energy sources. In Hawaii, the State Legislature passed a law in 1977 which gives nonutility producers of power such as the sugar plantations more leverage in negotiating a fair price for their product. This gives the plantations an incentive to upgrade their boilers and produce more power from the same amount of bagasse. The intent of the law is to expand output of biomass-fueled power in order to cut down usage of fossil fuel.

The new modern boiler now under construction at Lihue Plantation's factory in Lihue will be the first of its kind on Kauai. The supply contract between Lihue Plantation and the Kauai Electric Division of Citizens Utilities Co. has been approved by the Public Utilities Commission. The utility has agreed to pay a more reasonable price for the dependable power that will be supplied, which will postpone Kauai Electric's capital investment in a new generating unit for three or four years.

Foster Wheeler Corp. will build and own the new power plant, and has contracted to have Lihue Plantation supply the fuel and operate the plant in exchange for all of the power and steam requirements of the Lihue mill. The plant is scheduled for completion in August 1980, and will go into operation after a period of testing. The plant must provide a capacity of 12,000 kilowatts for 48 weeks of the year, and Kauai Electric is obligated to purchase 55.6 million kilowatt hours of power during that period. The remaining 8,000-kilowatt capacity will be for the needs of the mill. All revenues will go to Foster Wheeler as owner of the plant. Under the contract, Kauai Electric is permitted to purchase up to 96.8 million kilowatt hours of power if that kind of load can be generated. There is an incentive for Lihue Plantation to provide more than the basic 55.6 million kilowatt hours because any revenue above the basic load will be shared equally with Foster Wheeler. Burning fuel oil to produce that added power will be too expensive, so Lihue Plantation will have to look to cane trash, municipal refuse, wood chips or other biomass alternatives to generate the extra supply. The rate to be paid for the basic 55.6 million kilowatt hour load has an inflation rider, with the price to be adjusted based on changes in the Consumer Price Index and the prices of the two grades of fuel oil used. If Kauai Electric wants to buy power beyond the 48-week contract period, during the off-season when bagasse normally is not available, it will have to pay for the fuel oil required to generate the power.

This pace-setting contract for the first time places a normal market value on power generated by a nonutility in Hawaii. It will be the forerunner of other agreements that will help boost production of biomass-fueled energy and help the state reduce consumption of high-cost imported oil. Further petroleum price escalation will improve the economics of sugar production because the power by-product will fetch better returns.

Three other plantations on Kauai have been selling dump power to Kauai Electric for a decade or so. All of them could increase the output of power for export to the utility, but up to now the price has been too low to make the investment worthwhile. If they are able to negotiate favorable terms, all are ready to improve the efficiency of their generating units. Rates have generally been running between four and eight mills per kilowatt hour.

The County of Kauai is studying the economics of processing refuse as an alternate energy source. It is in the process of selecting a consultant, who will determine whether the project is feasible, and if so, whether the County should build a generating unit or sell the refuse to others, such as Lihue Plantation.

The hotbed of alternate energy research in the state is Wilcox Medical Center in Lihue, where two facilities are in operation, two others are under construction, and the fifth is in its early stages of development. When all of these projects are completed and in operation, up to 80 percent of the hospital's energy requirements could be met. The peak demand currently is 560 kilowatts.

The five projects are a biomass conversion system, a photovoltaic solar system, two separate solar hot water systems, and a wind power conversion network. They are funded mainly by federal grants, but also by State and private grants plus a matching amount on one project by the hospital.

The biomass project will use cesspool material and kitchen scraps to make methane gas to heat the hospital's boiler. This facility went into operation in mid-September, and the energy that it will produce is equivalent to 56,250 kilowatt hours per year, with savings of up to $6,400.

The photovoltaic project will need an acre of land next to the hospital where the parabolic solar collectors will be placed. The silicon cells will convert solar energy directly into electrical energy totaling 102,000 kilowatt hours per year, depending on weather. The project cost is around $2.3 million. Work will begin next spring, and the system is to be completed by December 1980.

The two solar hot water systems will provide all of the needs of the Outpatient Department and the Long Term Care Facility. The former was funded by private grants and is in operation. The latter will be built with a grant of $69,000 from the Department of Health, Education and Welfare, and a hospital match of $33,000. The solar systems will supply a thousand gallons and 2,166 gallons daily respectively of hot water to the two patient sections, and are expected to be 90 percent efficient. During the 10 percent of the time when cloudy weather or rain reduces hot water output, the methane-fueled boiler will act as backup.

The first phase of a three-phase wind power conversion project has begun with a $50,000 grant from the State. The next two phases will probably be financed by the Department of Energy. This system is to be connected with the photovoltaic system with the ultimate objective of some energy storage, possibly in fuel cells. When weather reduces the production capacity of these two systems, the boiler will be the reserve. All five systems will be integrated eventually through the backup provided by the boiler, and will provide the hospital with most of its energy generated from nonfossil fuel sources. Small projects like these are generally not economical because of high capital costs, but the Department of Energy funds them mainly for research, through which it hopes to make later and larger models more cost-effective.

AGRICULTURE

Agriculture made a nice comeback on Kauai in 1978 on the strength of substantially increased revenues attributed to unprocessed sugarcane. The farm value of sugarcane last year was placed at $39.6 million, 23 percent more than the $32.2 million reported for 1977. Total receipts for all agriculture were $46.8 million last year, 21 percent more than 1977 receipts of $38.8 million. Kauai sales of diversified agricultural products, small

compared to the other three counties, amounted to $7.2 million in 1978, only 5.4 percent of the state total for diversified agriculture, but up 10.6 percent over 1977 sales. The total doesn't include receipts for aquaculture products because the State Legislature must decide whether those statistics are to be included in agricultural receipts or in some other category. For 1978, it won't matter much where aquaculture is reported because the first harvests began in midyear, and the total for the year was not as significant as it is expected to be in a few years. The rather substantial gain in diversified agriculture last year was made possible by the large gain in livestock sales, mainly cattle and hogs. Increased marketings of these two categories of livestock combined with higher prices accounted for the substantial gains in revenues. The number of cattle sold last year totaled 6,100, a 13 percent gain over the previous year. Average price for the year was 39 cents a pound, substantially above the 34.7 cents of the year before, and receipts amounted to $2.3 million. That was close to a 22 percent gain over 1977 sales of $1.8 million. Although 70 percent of the increase in the volume marketed was in the sale of grass-fed animals, feedlot-finished animals accounted for two-thirds of the dollar gain because of a much steeper rise in price—from 35.6 cents to 43.4 cents a pound for grain-fed cattle, and from 34 cents to 35.8 cents for grass-fed cattle.

Hog production on Kauai showed a substantial increase in 1978 as a result of the 25 percent increase in the number of growers during 1977. The 100 farms last year sold 3,700 heads compared with 2,900 the year before. The average price received by the farmer was 74 cents a pound last year, the highest of any county and substantially above the state average price of 60.5 cents. Total sales amounted to $486,000, 28 percent more than the $380,000 in receipts during 1977.

Crop sales in 1978 had only a small gain due to the decline in papaya production. Kauai's largest diversified agricultural crop. Crop sales totaled $3 million compared to $2.9 million in 1977. Offsetting the 16.6 percent drop in papaya sales were gains in sales of vegetables, taro, and nursery products.

Vegetable sales during 1978 increased 19 percent over 1977 with total receipts of $659,000. The increase was attributed to higher receipts for cucumber, eggplant, and watermelon due mainly to better yields. Acreage in green peppers was cut last year but better yield and higher prices helped farmers match receipts of the previous year.

Taro farmers reported record receipts for their 1978 crop although production was below levels of the first half of this decade when there were more farms raising taro. Receipts last year were $615,000, up from $588,000 in 1977. Kauai farms have by far the best yield in the state, but the higher receipts last year were made possible mainly by higher prices for their produce.

Kauai's sales of flowers and nursery products took a nose dive in 1976 when the year's total was less than one-third that of 1975. Sales have been recovering since then and last year they were up 64 percent from 1977 to $279,000.

Seed corn is becoming a more economically important crop on Kauai, with the addition of a third farm operator the past summer. Pioneer Hi-Bred International and Northrup King's Pride Seed Division have been farming on the island for more than a decade. The past summer, DeKalb AgResearch Inc. leased 50 acres of land in Hanapepe valley, and its first crop is already in the ground. DeKalb had been farming 45 acres at Ewa Beach until last spring when its lease expired, and it moved to Kauai. These three firms represent the nation's largest seed corn research and sales outlets. They have leased more than 200 acres—mainly in Kekaha and Waimea—for their research work. The addition of DeKalb makes Kauai the major seed corn research county of the state. Seed corn research is also done on Molokai, Maui, and Hawaii.

Sugar

The long drought of the 1970s which rains alleviated last year continues to have an adverse impact on Kauai's sugar production. The 1978 crop amounted to 223,059 tons of sugar, compared with 231,685 tons in 1977. The 1979 crop will be larger than last year's but it is going to be below earlier estimates because of drought plus three weeks of no irrigation during the 1977 strike.

With water a major problem, Kauai's plantations are continuing to expand their acreage of drip-irrigated fields, after experiencing good results from earlier investments. Kekaha Sugar Co. has suffered a water shortage for several years, and even this past summer its ditch flow was only 60 percent of normal. It is continuing to install drip irrigation systems in more fields and next year will complete conversion of all of its mauka fields. Then it will start on its makai fields. By planting in furrows, the plantation could not irrigate the cane adequately with the lower volume of water it is getting from its mountain sources. The efficiency of drip irrigation will not only allow more adequate delivery of water to the sugarcane, but the addition of more acreage for cultivation. Olokele Sugar Co. is beset with problems similar to Kekaha's, but its almost total conversion to drip irrigation is helping it to use the smaller volume of water much more efficiently.

McBryde Sugar Co. is looking for a fair increase in its production this year, but not expecting a normal crop until 1980. The drought has had an adverse impact on production, and McBryde is planning to increase its irrigated area. At present a little more than one-third of its 13,092 acres is unirrigated. And its plan calls for converting 80 percent of its irrigated acreage to drip irrigation. By the end of this year it will have 4,000 acres in drip. Lihue Plantation Co. will have the biggest production increase on Kauai this year, but its future crops are going to be affected by the loss of some of its most productive lands to airport expansion, two shopping centers, and an industrial subdivision. It too will convert more acreage to drip irrigation for more efficient use of water in the drier Kealia section. In two or three years, the plantation hopes to have up to 6,000 acres converted.

With parent Amfac Inc.'s decision to test the fresh pineapple market, Lihue Plantation has started seed cultivation at Moloaa from suckers scrounged from pineapple plants abandoned in 1973 when Hawaiian Fruit Packers went out of business. Amfac was in the pineapple business at one time with its Hawaiian Canneries subsidiary in Kapaa, but this company was liquidated in the early 1960s ... when the industry was straining under heavy competition from low-wage foreign producers. About seven to eight acres have been planted at Moloaa, and as suckers appear, cultivation will be expanded. It will be several years before there is sufficient production of fresh fruit for market tests.

Aquaculture

Kauai's prawn growing farms on the North Shore have had a full year of experience in the production, harvesting, and marketing of Hawaii's newest agricultural product. Kilauea Agronomics Inc. has 100 acres of ponds, and Prawns of Hawaii has 24 acres in production. Both had their first harvest in the summer of 1978. In the first year of harvest, their yield was below the state average which is estimated to be around 2,500 pounds per acre per year.

These firms, especially Kilauea Agronomics, have been pioneering the aquafarm culture of Malaysian prawns that were brought to Hawaii in the early 1960s and developed for production in ponds. These producers and the others on Oahu have been learning on the scene how to raise these crustaceans on a mass scale. This has been a time-consuming and costly effort, but the knowledge gleaned is going to make them more

efficient producers in the near future. One of the findings at Kilauea is that inclement weather appears to affect production adversely. More cloudy days than other producing areas and cooler temperatures on the average have so far kept growth rates below projections and yield has suffered. Work is continuing to gain more knowledge of the man-made ecosystem to improve production methods.

Marketing has not been a problem so far because supply hasn't yet met demand. Both firms have been successful in developing steady customers among the better hotels and restaurants throughout the state, and a few grocery chains. Test shipments are being made to the Mainland and Japan in order to gather information about those markets and about transportation and handling before heavier production requires overseas sales.

At Port Allen on the west side, Astro Marine Inc. has started an aquaculture project to raise a new golden-colored hybrid tilapia as a food fish. It has leased an old warehouse from Alexander & Baldwin, and will convert it into three concrete ponds with around a third of an acre of surface area. This hybrid fish grows very rapidly, and experiments at Astro Marine have found the growth rate to be five inches in five weeks, with the fish able to convert 1.3 pounds of feed into a pound of meat. This was done under ideal conditions where the tanks used were lighted at night so that the fish were eating continuously. A crop can be raised in four months, and by extension, three crops a year, or a production capacity of approximately 150,000 pounds a year for Astro Marine. The company says that the fish is tasty, and will be sold to low-income groups and senior citizens first before being offered to others.

This project is being funded by a Department of Energy grant for $50,000, and another grant for $50,000 from Alu Like Inc. The objective of the first grant is to use an existing energy that is free of cost to raise food. Astro Marine will use the thermal water from Kauai Electric Co.'s power generating plants nearby to raise the fish. The discharge from the plants is ocean water and the fish is a salt-water species. The latter grant calls for Astro Marine to teach native Hawaiians aquaculture and biology. Depending on the demand for the fish, Astro Marine has the option of leasing another warehouse next to the one it has leased.

Guava

Two years after Kilauea Agronomics planted its first guava trees, the C. Brewer & Co. subsidiary began to harvest 20,000 pounds of fruit last month, and it is projecting a million-pound crop next year. The spring harvest next year will be relatively light, but the late fall harvest is expected to be its first heavy crop. The processing plant is scheduled to be completed in the spring of 1981, with construction to begin around mid-1980. In the meantime, the company is having its fruit processed at the Hawaiian Fruit Preserving Co. in Kalaheo, which has expanded substantially its guava processing and handling capacity.

Kilauea Agronomics is marketing its guava puree locally, in Japan, and on the Mainland. The puree is being used in guava drinks or blended with other juices.

Hawaiian Fruit Preserving had limited its guava puree production to around 300,000 pounds annually because that was all its cold storage could hold. Its new freezer unit will now be able to handle up to 700,000 pounds of frozen puree. Its new automatic processing line will also be able to handle up to a million pounds of papaya annually, which will be made into puree to be used mainly in drinks but also for preserves. It finds that the market for jams and jellies is growing on the Mainland and also in Japan. Even with a quadrupling in production the company may not be able to meet the growing demand. The company depends on growers and individuals who pick wild guavas for the major part of its supply.

Papaya

Papaya production on Kauai took a sharp drop in 1978 while all other counties reported larger crops for the year. Total production was 5.3 million pounds, down 15 percent from the 1977 crop of 6.2 million pounds. The slightly higher prices last year didn't make up for the decline in production. The smaller crop was much better than expected, as the island's papaya cooperative had expected the year's production to be in the neighborhood of 3.5 to 4 million pounds. A good summer harvest and a strong November-December peak lifted production way above earlier projections. The short crop last year was caused by the failure of farmers to fertilize their orchards adequately during the early part of the year, and reduced acreage due to lack of replanting. Poor prices the previous year had left growers short of capital to make adequate investments in replanting and fertilization.

Improving prices last year helped farmers make those investments, and production this year has increased substantially while production has dropped sharply in other counties, causing a short supply of papayas. However, Kauai production is below forecast as winter rains destroyed close to 10 percent of the trees, and the disease problem combined with the loss to cut production by 20 percent. Despite the problems, production in the first six months of the year topped 2.7 million pounds, 30 percent more than in the first half of last year. July production was good, but a large proportion of the harvest had to be discarded because the grounding of the DC-10s left little air cargo space for the Mainland. Nevertheless, production marketed for the first seven months reached 3.1 million pounds, up 17 percent from the comparable period last year.

The short supply of papayas this year due to reduced harvests on Oahu, Maui, and Hawaii has pushed prices up steeply, and Kauai growers have benefited substantially as they have the only increasing production. The average wholesale price for the first seven months in 17 cities across the country that are monitored was 90.3 cents a pound, up 41 percent over the average for the same period last year. Prices have peaked, but are expected to stay substantially above last year's because statewide production is projected to be down drastically from last year.

Anticipated heavy yields the rest of the year are expected to bring Kauai's production to more than 7 million pounds, more than one-third better than last year. Heavy planting the past spring will help production early next year which should give cooperative members a marketing advantage. There will still be a shortage in Big Island production as Puna will not have overcome the loss of 300 acres of bearing trees to storms early this year. The market should easily absorb Kauai's increasing production until new acreage in the Puna area begins to produce.

The drip-irrigated fields at Moloaa give cooperative members an average yield of 40,000 pounds of fruit per acre annually, which is far higher than any other area in the State. However, the Sunrise variety—a pink-fleshed, firm papaya that ships well—is yielding 50,000 pounds per acre per year and its acreage is being expanded. Being slightly smaller than the predominant Kapoho variety, the Sunrise is highly suitable for marketing because the lower cost per papaya attracts buyers more readily. Best Fruits Inc., which handles packing and marketing for the cooperative, sent a shipment of the Sunrise to Hilo for agricultural inspection and on to Japan and found that it brought a premium price. To ship to Japan on a regular basis, Best Fruits would need to get the Japanese government to station an inspector on Kauai, but its application was turned down on the basis that Japan could not afford to station two inspectors in Hawaii even though they are paid by the local shipper. An inspector has been stationed in Hilo for several years.

Along with increasing revenues, growers are faced with

rapidly rising costs of materials and equipment. In the past two years, they have been hit with such increases as a two-thirds rise in the cost of fertilizer to $200 a ton, a 10 percent increase in the cost of boxes, substantially higher air freight rates, a more than four-fold increase in the price of diesel oil to 68 cents a gallon, and more than a doubling in gasoline prices to 94 cents a gallon. It is only the efficient, hard-working grower who can keep ahead of such unruly cost increases.

SCIENCE/MILITARY

The closing of NASA's Kokee Space Tracking Station has been postponed because the start of its space shuttle program has been delayed due to problems with the manned shuttle craft. Originally projected to terminate operations in 1980 or 1981, the tracking station will probably continue its space watch until mid-1983 or possibly longer. At the present time, the space shuttle program has fallen behind schedule by approximately a year and a half. The Tracking Data Relay Satellite System (TDRSS), which will do what Kokee and other earth stations are doing, is a complex device and putting the proposed two satellites in synchronous orbit may cause further delays. Once in orbit, the two satellites will be able to track all of NASA's space programs, and the 14 or so earth stations around the world will not be required. The satellites will relay signals to the earth station at Las Cruces, New Mexico, which is now under construction under the direction of Virgil True, who until earlier this year headed the Kokee station. The delay means that the staff of 120 that operate the Kokee station will continue on station for another four years or more. After NASA vacates the station, the Navy's Barking Sands Missile Range is expected to take over the tracking station, and many of the station staff will be transferred to the Navy payroll.

The missile range, which tests and evaluates weapons and assists in fleet training, continues to increase its volume of operations. It has a complement of around 125 military personnel and 52 civilian employees. In addition, Dynalectron Corp., which provides the technical and maintenance services on base, has more than 350 employees. Its contract was extended for another two-year term last month.

Kauai County Statistics

	unit	period	1974	1975	1976	1977	1978	8 mo. 1979	% change 8 mo. 1979/78
Population, Resident	number	July 1	32,100	32,700	34,000	34,400	34,700p	N.A.	—
Per Capita Personal Income	dollars	total	5,394	5,519	5,894	6,738	N.A.	N.A.	—
Civilian Labor Force	number	mo. avg.	15,050	16,350	17,200	17,850	17,450	17,700p	1.1
Employment	number	mo. avg.	13,750	14,850	15,600	16,650	16,250	16,650p	2.5
Unemployment	number	mo. avg.	1,300	1,500	1,600	1,150	1,200	1,100p	-12.0
Unemployment Rate	percent	mo. avg.	8.5	9.1	9.4	6.5	6.9	6.1p	-15.3
Total Jobcount[1]	number	mo. avg.	13,600	14,550	15,250	16,100	16,650	16,850p	1.2
Tax Collections	thous. $	total	15,951	18,113	20,803	22,375	25,858	21,924	16.6
Total Bank Deposits	thous. $	end per.	96,338	93,378	97,882	109,809	123,682	131,137	12.8
Deposits to Demand Deposits	mil. $	total	478.0	553.8	577.7	633.7	775.2	624.4	22.3
Private Residential Permits	thous. $	total	19,932	20,003	13,346	21,197	44,005	70,822	86.5
Single Family Units	number	total	396	343	321	445	565	391	8.0
Multi-Family Units	number	total	302	202	4	83	623	760	28.2
Private Non-Residential Permits	thous. $	total	10,908	16,086	3,755	6,822	7,711	10,472	115.6
Public Contracts Awarded	thous. $	total	15,095	31,579	14,310	11,364	10,156	12,341	277.2
Federal	thous. $	total	1,010	407	2,571	428	3,343	173	-61.7
State	thous. $	total	6,458	25,865	7,684	5,628	2,627	7,467	318.0
County	thous. $	total	7,628	5,308	4,054	5,308	4,180	4,201	233.7
Estimated Westbound Visitors	thous.	total	601.7	632.8	693.3	740.5	837.7	580.2p	3.9
Intended Length of Stay—Westbound	no. of days	mo. avg.	2.72	2.85	2.85	2.97	3.08	3.26p	5.5
Hotel Inventory	number	June	2,932	3,145	3,724	3,868	4,047	4,064*	0.8
Hotel Occupancy	percent	mo. avg.	78.1	77.2	76.8	80.6	83.3	79.0	-3.0
Telephones in Service	number	end per.	19,498	20,851	22,073	23,576	25,995	26,738	7.9
Motor Vehicle Registration	number	total	22,560	23,901	25,366	26,912	28,080	N.A.	—
Sugar Production, raw sugar 96°	thous. tons	total	227	240	217	232	223	169	10.3
Diversified Agriculture[2]	mil. $	total	5.3	5.2	5.3	6.5	7.2	N.A.	—
Crops	mil. $	total	2.4	2.4	2.3	2.9	3.0	N.A.	—
Livestock[2]	mil. $	total	2.9	2.8	3.0	3.6	4.3	N.A.	—

p preliminary
N.A. not available

*As of June

[1]Refers to number of jobs rather than number of persons employed. Persons with more than one job are counted more than once.

[2]Includes estimates for milk, chickens, and eggs.

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MAUI COUNTY IN 1979

A Report by the Research Division *November, 1979*

In 1979 Maui County saw the end of a political era during which the economy grew at unprecedented rates, and the start of a new administration that will have to face the challenges of the 1980s and deal with many of the problems born of that growth. Mayor Elmer F. Cravalho, who resigned in July, had taken over a county with an anemic economy a dozen years ago and given it the direction and stability to become number one among the counties. The new mayor, Hannibal Tavares, elected on October 20 by a landslide and sworn into office November 9, will face as his major problem the issue of growth. While his style as chief executive officer is expected to differ considerably from the former mayor's, his position on the major issues will probably be much the same.

Meanwhile, the economy keeps on growing at rates considered uncomfortably high by both the government and residents of Maui. Tourism had a spectacular year in 1978. Visitor arrivals increased by 146,000 to 1.4 million, and visitor spending jumped almost 25 percent to $283 million, a figure that approached the combined spending on Kauai and the Big Island. Despite the strike against United Airlines and the grounding of the DC-10s in the second quarter of this year, tourism has made a remarkable comeback on Maui with record months for July and August, making 1979 another record year. Sugar and pineapple experienced slight declines in revenues last year, but sugar is expected to have a better year in 1979. Construction is a strong factor in the economy—the value of all construction authorizations in 1978 amounted to $212.5 million, Maui's first $200 million year and more than double the $101.6 million worth of authorizations in 1977. For the first eight months of 1979, the pace has slackened, but the total for the year will be the second highest on record. Retail sales were very strong last year. Volume was affected during the United Airlines strike and the DC-10 grounding in the second quarter of this year, but sales have snapped back and a 20 percent or better increase for 1979 is in the making.

Employment is benefiting from the growing economy. The increase last year was slight, but the rate has been accelerating so far this year. For the first nine months, employment gained 5.5 percent to 30,450. Unemployment dropped by 200 and the rate of unemployment fell from an average 7.5 percent in the first nine months of last year to 6.6 percent for the same period this year. By September, the rate was a low 5.5 percent, indicating that Maui employers will have some difficulty recruiting new workers. Hotel employment, for example, increased 9.2 percent in 1978 to 3,550, but in the first nine months of this year the gain was 15 percent to 4,050. During the same nine months, construction employment gained 19 percent, other services rose 9 percent, retail trade climbed by 5 percent, while government employment fell slightly.

Money circulation and taxes collected reflected the intense pace of economic activity on Maui. Total bank deposits in 1978 rose 19.7 percent to $216 million, and in the first nine months of this year increased to $244 million, 15.4 percent over the same period last year. Checks written against checking accounts increased 29.4 percent in 1978 to $2.2 billion. For the first nine months of 1979, the increase was 24.3 percent to $2.1 billion.

Taxes collected for the first nine months of 1979 totaled $51.5 million which was 18.8 percent more than the $43.3 million collected in the same period of 1978. This increase was accomplished even with the real property tax rate slashed from $9.09 to $6.47 per $1,000 of net assessed valuation. Even so, real property tax collections for the first nine months of 1979 amounted to $11.6 million, about the same as in the same period of 1978. However, County finances will be an immediate problem for the new administration. The amended budget left the County short of funds especially when the pay raises presently being negotiated for County employees are taken into account. The mayor has the County Council's authorization to float a bond issue totaling $10.5 million, which is earmarked for two things—$7 million to bring the county in compliance with the Clean Water Act, and the remainder for various capital improvement projects. At the end of fiscal 1979, the County had a surplus of $6 million, but that has been incorporated into the new budget. The County will need a minimum $1 million for pay raises, and this may require an increase in the real property tax rate. Although this may be distasteful politically, Maui still is in better shape than the other counties in this respect as the Maui tax rate is way below half that of any of the other counties.

Maui County has been spared even more rapid growth for several years because of the lack of water and the construction moratoriums that have been in effect in West Maui, the Central Valley, and Kula. New requirements for water are greatest in the Central Valley, and the County Water Board adopted new regulations this past summer that will keep the construction moratorium partially in effect. The County will be able to increase its daily water distribution by only 1.5 million gallons in 1980 and another 1.5 million in each succeeding year. It will be able to authorize construction of hotels, condominiums, industrial, business, or commercial projects up to that level of water availability only, on a first-come, first-served basis. But the County will charge a water source development fee of $2,700 for each hotel or condominium unit and a similar amount for each 1,200 gallons per day of projected use for industrial, business, or commercial projects. It is estimated that this amount of water would limit approval for a new condominium construction in the Central Valley to about 800 units a year.

Housing is another pressing problem, but the County has had a good program going for a few years, with financial assistance from federal and state agencies and private sources. There are three public projects under construction on Maui and one each on Lanai and Molokai. Two other projects are almost ready to be started on Maui, and three additional projects for Maui and one for Molokai are in the planning stages. These projects total 963 units, including 80 rental units for the elderly on Molokai and 180 on Maui.

In addition to County-sponsored housing, the private sector is also developing single-family subdivisions to fill a great demand. Amfac Inc. is developing a 280-unit subdivision above

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Lahaina for employee housing that will be sold to employees of Pioneer Mill Co., the Hyatt Regency Maui, and the Marriott Hotel. Amfac has also dedicated 30 acres of land near Lahaina to the County to be used for employee housing. A&B Properties has started to market the 200 lots of its Kuihelani subdivision, with a number of those lots to be sold at a discount to plantation employees who do not own a home. C. Brewer & Co. will begin work next year on 270 fee simple lots in Wailuku Heights. Lots will range from 8,500 to 12,000 square feet in size, and homes must be built within three years after plans are reviewed for architectural standards. A second increment of 130 lots will be cleared and improved after the first is completed.

The new County administration will also have to determine the kind of agricultural program it will encourage. The previous administration was in the process of creating an agricultural park on some 450 acres in lower Kula to be leased to qualified farmers who have no land to farm. The County had obtained part of the acreage and was in negotiations for the remainder. It had also been pushing for agricultural development of Molokai. A 150-acre forage operation funded mainly by the Molokai Task Force has worked out well so far in production and sales. Now a cooperative of Hoolehua homesteaders is seeking a large Task Force loan to start growing alfalfa in a 527-acre farm near the airport. And the Molokai ag park is nearly leased out, but there is more land for expansion if the County wants to push this program. The previous administration had given its strongest commitment to agriculture.

TOURISM

After two decades of statehood, the visitor industry has become by far the dominant industry of Maui County. In the past decade, its growth rate has far surpassed that of any other county in the state. When Hawaii became a state in 1959, sugar was the major provider of jobs in the county, followed by pineapple. Sugar revenues that year totaled $29 million, while the visitor industry on Maui was grossing in the neighborhood of $7 million. By 1969, however, tourism had overtaken sugar as far as revenues were concerned, sugar having grossed $43 million compared to tourism's $49 million. It was in the past decade that tourism outdistanced sugar, reaching total revenues of $283 million to sugar's $67 million last year. Visitor expenditures showed a 24.5 percent increase over 1977 expenditures, and close to a sixfold increase since 1969.

Visitors to Maui County last year numbered 1.4 million, an increase of 11.6 percent over 1977. The rapid growth in the number of visitors in the last three years has far surpassed the gains made by the Big Island or Kauai. The growth for Maui County accelerated in the first quarter of 1979, with almost 15 percent more visitors than in the first quarter of 1978. As in the other counties, the United Airlines strike and the grounding of DC-10s affected Maui's visitor arrivals in the second quarter. However, Maui rebounded robustly in July and August, and had close to a million visitors by the end of August.

The transportation interruption affected all resorts and condominiums, but the well-established hotels recovered quickly. Kaanapali is a good example of the well-established destination area. Occupancy for the four hotels there slipped to 74 percent in May but by July it was almost back to 90 percent, and has been over 90 percent since. The hotels at Wailea are newer and therefore less well-known, and the effect was greater. Kapalua Bay Hotel opened a little over a year ago, and it felt the interuption more than the established hotels.

Maui County has proved its strong attraction for visitors, and occupancy rates keep climbing. To meet this continuing need for more visitor facilities a number of major projects are in the works.

Under construction at the Kaanapali Beach Resort is the 820-room Hyatt Regency Maui, which is scheduled for completion next April. It will be Maui's largest hotel. It is being developed by Christopher Hemmeter on 20 acres of land at the Lahaina end of this resort complex. Three main structures, with ocean views, are being built around landscaped grounds. Streams, waterfalls, and pools will be strongly featured in the tropical and oriental gardens. Restaurants and bars will be nestled in the gardens. There will be 25,000 square feet of space for meetings and banquets, able to accommodate from 100 to 2,000 persons. Shops will take up 18,000 square feet of space in the hotel. The $80-million hotel will employ 750 persons and will make the Kaanapali resort Maui's major employer. Hemmeter will own the hotel, but it will be operated and managed by the Hyatt Hotels Corporation, which also manages Hemmeter's other hotel, the Hyatt Regency Waikiki.

Right next to the Hyatt, the Kaanapali Beach Partners are building another hotel, which will be the sixth for this resort. This 720-room hotel will be operated by the Marriott Hotel chain. Plans call for two eight-story towers connected by a three-story section, all with ocean views. The central grounds that will be surrounded by the buildings will have a pool and luau area. Construction has just begun on the 15-acre lot, and completion is scheduled for October, 1981. The hotel will employ around 700 workers. This $50-million hotel will be Marriott's first in Hawaii, but its second, at Princeville on Kauai, will not be far behind in opening. Marriott is also looking for hotel sites on Oahu and Hawaii.

The remaining eight-acre beach frontage between the Marriott and the Maui Surf Hotel will be a condominium apartment site. Hawaii Omori Corp. is planning four towers of 11 stories each with 264 units in all. The one- and two-bedroom units will average 1,700 square feet in area, and will sell at luxury prices. Groundbreaking is scheduled for late next spring with construction expected to take two years.

Under construction on 7.2 acres across the road from the Maui Eldorado is the 105-unit Kaanapali Royal, a luxury condominium of two-bedroom, two-bath apartments with 2,000 square feet of floor space including lanai. The average price is $325,000 and a 20 percent deposit is required. The Honolulu firm of Gushman and MacNaughton is the developer. Completion is anticipated by mid-August next year, and all units have been sold.

Just north of the Kaanapali resort, the Ainalanikai Corp. is building the 463-unit Kaanapali Shores condominium, made up of a nine-story and a four-story structure, and a three-story parking building. Prices of the studio, one- and two-bedroom units—all sold—range from $110,000 to $300,000. Completion is expected by the end of next year.

The two most luxurious condominium projects at the Kapalua resort are nearing completion. The Ironwoods, a 40-unit complex with four units in each of ten buildings, is expected to be finished before the end of the year or soon after that. The Ridge is a 28-building complex including 161 condominium units, a recreation building, and the manager's home. Seven of the buildings were expected to be finished this year, and the remainder next year. The Shops, a commercial structure next to the Kapalua Bay Hotel, has been completed. There are 25 retail outlets in the structure, and most of them have opened.

Development of the large Wailea resort continues steadily. The third increment of the Elua project of 66 units is nearing completion, with 18 nearly finished, and the remainder to be ready early next year. These are luxurious units with prices averaging $388,000. Two projects on the north end of the resort will be ready for construction soon. One is the Wailea Alanui Village, a 229-unit condominium that will be built in three increments of 88, 81, and 60 units. The first increment is scheduled for completion late next year, and the remaining two in 1981. The Wailea Kai homesites is a 100-lot subdivision with lots averaging 9,500 square feet. Grading has started and lot sales will begin next spring. In the planning stage is a 199-unit luxury condominium that Mike McCormack will build at Wailea on the beach next to the Wailea Beach Hotel. There will be several structures with one- and two-bedroom units on the 10.5 acres. To be known as L'Abri, the project will get under way next spring.

Wailea Development Co. is working on the design for expansion of the Town Center, the resort's commercial core, which will double the size. It has also decided to enlarge its Tennis Center from 11 courts to 24, with five courts to be built next year. It is expanding its infrastructure for future development of its vast property by installing a three-million-gallon water tank, a water distribution system, and roadways in the undeveloped areas.

The Maui Lu Hotel, which sits on 30.1 acres in Kihei, is being expanded by Headway Hawaii Inc., a subsidiary of a Canadian company, which purchased the property from J. Gordon Gibson in October, 1977. It has built a $4.5 million restaurant and commercial complex on the site of the old restaurant which was destroyed by fire. The 186 original rooms of the hotel will be reduced to 168 rooms to make way for the new 232-unit hotel now being built. The new hotel will be low-rise Polynesian like the original. The firm is also planning a 220-unit studio and one-bedroom complex, with most of the units to be sold as condominium apartments. Construction is to start next spring. The new hotel will cost $7 million including various facilities now underway, and the other project is estimated to cost $15 million.

Kalua Koi Corp.'s West Molokai resort community is beginning to expand with the 77-unit Paniolo Hale now under construction. It is scheduled to be completed next August. In the planning stages are three other condominium projects with a total of 440 units. They will be clustered around the Sheraton Molokai Hotel and the Paniolo Hale. The hotel opened its new Paniolo Steakhouse last March.

ENERGY RESOURCES

Of all the Neighbor Island power utilities, Maui Electric Co. benefits the least from alternate energy generation because the requirements of the nonutility producers are so great that they have little left to sell. Hawaiian Commercial and Sugar Co. and Pioneer Mill Co. are the only nonutilities producing power on Maui and they have an exchange system with Maui Electric Co. There is quite a bit of exchange between the utility and the two plantations, but in the course of a year the plantations end up with small net exports. Both plantations need to pump large volumes of water from wells for irrigation which requires tremendous amounts of power. As with other sugar plantations, their power is generated by burning bagasse. When there is a shortage of bagasse, fuel oil is substituted. Both are improving their systems so that they can cut down the use of fuel oil which this year alone has gone up in price from $13 a barrel to more than $20 a barrel.

Hawaiian Commercial and Sugar Co. has factories at Puunene and Paia. The latter normally has a surplus of bagasse, and Puunene now will have a surplus also because it processes sugarcane for Wailuku Sugar Co. The company is testing the feasibility of baling bagasse for storage so that there would be fuel available during the off-season to reduce usage of fuel oil. Last year its fuel oil bill came to $2.6 million. The reason for this large oil usage is that it has a commitment of 5,000 kilowatts of capacity to Maui Electric, which needs it during peak consumption hours. If baled bagasse can be stored without causing spontaneous combustion, this could be an answer to high fuel costs. The plantation is planning to install a bagasse dryer at its Paia mill next year to reduce smokestack emissions to meet environmental standards. The reduction of moisture content from the bagasse will improve burning quality, and provide more heat and consequently more power. The plantation also generates a small amount of hydroelectric power, and is studying the possibility of installing a low-head hydroelectric plant above Paia with a capacity of around 500 kilowatts. All of these proposals could make Hawaiian Commercial and Sugar more self-sufficient in power and better able to supply power to Maui Electric.

Pioneer Mill started using cane trash for fuel this year, and the project is going well. The trash is separated from soil and rocks in the mill and hauled to the field to dry for two to three months. By then the moisture content is down to around 40 percent and the trash is returned to the mill and sent by conveyor through a shredder, and then combined with bagasse for burning. The excess will be stored for later use. The plantation is also considering the purchase of wood chips from Maui Hardwoods as another biomass fuel for its boiler. At present prices, $12 worth of wood chips would produce the same amount of BTUs as a barrel of oil at $21. Bagasse is the cheapest fuel because it's a byproduct, but wood chips would be a good substitute for oil when bagasse and trash are not available. The plantation is also studying the feasibility of municipal refuse and solar energy for increasing power output at lower cost.

Molokai is a prime candidate for becoming self-sufficient in energy. The higher prices for oil paid by Molokai Electric Co. in this isolated community have sent electric rates for consumers way up. Its new diesel generator of 1,600 kilowatt capacity went into service in May, and it will need another generating unit by 1982, which will probably be a gas turbine generator. Beyond that the utility is hoping that alternate sources of fuel will take care of the island's future needs. The feasibility of using the pineapple plant as a source of fuel and the building of a small hydroelectric plant at the Kualapuu reservoir are now under study. Two firms are studying the feasibility of starting windmill power generating plants on the island, and have talked to Molokai Electric about power sales if those projects go through. With respect to solar energy, the utility is still waiting for word from the Department of Energy which is expected to call for applications from utilities in remote, high-cost areas for setting up experimental solar energy generating units.

AGRICULTURE

Agriculture posted another good year in Maui County during 1978. The total value of crop and livestock sales increased by more than $6 million to $91.6 million for the year, a 7.2 percent increase over 1977. However, Maui County's increase was the smallest among the counties, and was far below the average state increase of 16.4 percent. A decline in the output of feedlot cattle and in the value of pineapple kept Maui from attaining the large growth that the other counties enjoyed during 1978. These declines, however, were more than matched by the increased value of grass-fed cattle and hogs, sugarcane, and diversified crops marketed during the year.

Sugar revenues for Maui County in 1978 amounted to $67.1 million including federal payments, down from the 1977 gross of $73 million. However, the farm value of sugarcane harvested last year totaled $43.6 million, up 17.5 percent from 1977's $37.1 million. The reason for this discrepancy is that $8 million in federal payments for the 1977 crop was paid in 1978. This deferred payment was included in the State Department of Agriculture's farm value figures but not in the industry's gross revenue figures.

The pineapple harvest for Maui County increased 7.5 percent last year to 488,000 tons, but the agricultural value of the fruit slipped 7.8 percent to $28.3 million due to lower prices for canned pineapple products. The total statewide value climbed to another record in 1978, however, as the price for pineapple marketed as fresh fruit rose substantially. Just about all of the fresh pineapple shipments were from Oahu.

Revenues from diversified agriculture reached $19.7 million last year for a new high for the county. Making up this total were value of crop sales that reached $10.4 million, up 14.2 percent over 1977 sales, and livestock sales of $9.3 million, up 8.4 percent over 1977.

Diversified crop sales achieved a record, boosted by a nearly 50 percent gain in sales of flowers and nursery products to $2.5 million. Also contributing to the gain were a 24 percent increase in sales of fruits, mainly papaya, to $1.6 million, and a 13.8 percent increase in sales of forage to $1.3 million. Sales of vegetables were up only slightly. Maui will get a new diversified agricultural crop, with the announcement by C. Brewer and Co.

that it will put in a 2,000-acre macadamia nut orchard at Waiehu over the next five years. Planting has started.

Livestock sales gains were helped by a 9.8 percent increase in the value of hogs marketed at $1.6 million, an almost 27 percent gain in sale of eggs, a slight increase in milk sales, and an 8.3 percent increase in sales of cattle. Feedlot cattle sold by Maui ranches were down sharply to 6,900 head last year from 8,500 in 1977. But prices were substantially higher last year and receipts were only slightly below 1977, totaling almost $3 million. Grass-fattened cattle sold from Maui ranches increased 200 head to 4,900, but the animals weighed less and ranchers didn't gain much from higher prices.

On Molokai, however, ranchers did well all around last year. They sold more feedlot-finished and grass-fed cattle. Both types of animals were fatter, and with higher prices prevailing, receipts for both feedlot cattle and grass-fed cattle were substantially higher than the year before. Hogs marketed by Maui and Molokai growers last year increased by 500 over 1977 to 12,600 head. Although the average price was down for the year, heavier animals gave growers larger receipts.

Growing of fruit for the juice market is going to be encouraged among small growers in the Hana area by Orchards Hawaii Ltd., a local partnership that has bought out the RJR Foods plant in Kahului that processes passion fruit. The new company will have RJR Foods as its major customer but will also invade the institutional market on the Mainland where demand for tropical fruit puree is growing. It is going to give up the corporate type of crop production in favor of the cottage type and have people with small acreage in the Hana area grow passion fruit, guava, and papaya which it will buy. For those who qualify to grow passion fruit for the company, trellis material will be provided without charge. The company may manufacture jams and jellies after the juice market is established.

The Tedeschi Winery at Ulupalakua Ranch is expecting to harvest its first crop of Carnelian grapes from its 15-acre vineyard next spring. The vineyard will be three years old then and a large crop is not expected, but the winery will be able to produce its first vintage, which is being awaited with anticipation by many people. Being a red wine, it will have to be aged from three to five years before it is released, however. In the meantime, the winery has been producing its Maui Blanc, a pineapple wine. It is marketed only within the state, and production this year will be 5,000 cases, up from 3,000 cases last year. A second product has been developed, which is a sparkling wine also made from pineapple. It will be marketed for the first time during the holiday season this year.

The County's baitfish program of the past year was not as successful as expected, because the topminnow proved to be a poor substitute for the nehu. A total of 7,200 pounds of topminnow were raised for sea trials last summer. The tuna boats returned with 25,000 pounds of aku, which means that it required a pound of bait to catch four pounds of aku. In another test in which 2,600 pounds of nehu were used, the boat returned with 61,000 pounds of aku for a ratio of 1 to 25. The action of the topminnow in the water was inferior in attracting aku, according to an informal assessment. The County is now raising another type of minnow that is more active in the water for another sea trial next summer.

Sugar

The return of normal rainfall—breaking the summer droughts that lasted for most of this decade—is helping the Maui sugar plantations improve their yield and increase production this year. The lack of adequate water for irrigation in past years has hurt production. The 1978 crop amounted to only 245,342 tons of sugar, the smallest during this decade. It was 20,000 tons or 7.5 percent below 1977 production of 265,193 tons. In addition to inadequate irrigation, smaller acreage harvested and cane of below-normal harvest age were reasons for the small crop.

Improved rainfall the past year has brought great relief to the plantations. Higher water volume and ongoing conversion to a drip irrigation system have improved the outlook of sugar production on Maui this year and next. The crop this year could be around 250,000 tons or possibly more if good weather continues. Further improvement in yield and production is seen for the 1980 crop.

The marketplace for sugar has also been improving in the past few months, despite the lack of progress in sugar legislation by Congress. The spot price for sugar has been exceeding—since mid-September—the 15.8-cent-per-pound target price proposed in legislation that was voted down by the House in October. A major reason for the rise in sugar prices is speculation, however. The rapid rise in the prices of gold and silver has tended to pull other commodities upward, including sugar. Another reason for the rise may be attributed to the forecast that sugar consumption will exceed production next year for the first time in six years. However, the world sugar surplus is large, and it would take a few years of high consumption to trim it down to manageable size.

Although there still are three plantations on Maui, one of them—Wailuku Sugar Co.—is having its sugarcane milled at another plantation. The company decided last year to get out of milling because needed repairs to its old mill would have been uneconomic. The lack of a mill does have its drawbacks, however. When the mill was in operation, Wailuku Sugar had a source of electric power to pump water for irrigation. It doesn't now that its sugarcane is processed at Hawaiian Commercial and Sugar Co.'s Puunene mill. Meanwhile, the cost of power has soared, and the cost of pumping water has skyrocketed so that it is uneconomical to do so based on the return for sugar. The plantation's drip irrigation program is going to help but lack of adequate water the past summer will affect yield in future crops. Wailuku Sugar's 5,200 acres are too small to operate an economically sound plantation, and it will get smaller with the announced conversion of some of the acreage to a macadamia nut orchard. C. Brewer and Co., the parent firm, has a five-year program to put in 2,000 acres of macadamia nuts, with most of the land being taken out of sugar. More than 100 acres have already been planted.

If Wailuku Sugar is encountering some problems due in part to smallness in planted area, neighboring Hawaiian Commercial and Sugar Co., as the state's largest plantation, is beginning to see better days ahead. The drought really hurt the plantation because sugarcane acreage of more than 34,000 acres requires a tremendous amount of water to sustain normal growth. In 1978 HC&S's sugar production tumbled to a decade low of 170,166 tons, down 17,671 tons from 1977. In addition to the drought, a smaller acreage harvested and younger cane caused the production drop. With the return of heavy winter rains the past year, the water supply situation has improved and the future crops are benefiting tremendously from adequate irrigation. In fact, the winter rains were so heavy that the start of 1979 harvesting was delayed at HC&S and some other plantations. This means that HC&S will not be able to complete its harvest. This year's production should be more than last year's. The unharvested fields will be carried over into 1980, which will be advantageous because sugar prices are rising.

Cane tonnage and sugar yields at HC&S are heavier this year than plantation projections. The average yield through September was 12.7 tons of sugar per acre compared with 11.1 tons for the same period of 1978. For one thing, the proportion of drip-irrigated fields harvested this year is higher than in past years and the yield from them is better than anticipated. Another reason is that the delay in harvesting has meant that the cane was 1.8 months older on average at harvest, having had that much more time to grow and store sugar. The experience so far with results of drip irrigation shows that yields have increased from two to two and a half tons of sugar per acre, not only at HC&S but at other plantations. Three drip-irrigated fields harvested this year averaged 17.2 tons of sugar per acre. Before their conversion to drip, these three fields held the record for furrow-irrigated fields, averaging 14.6 tons of sugar per acre. Cane tonnage in drip-irrigated fields has increased 28

percent for each unit of water applied. More than 3,000 acres are being converted to drip annually at HC&S, and by the end of this year, 17,564 acres or about half the fields will have been converted. Drip irrigation, which is about two-thirds more efficient in water usage than furrow irrigation, has allowed the addition of 3,200 acres of new land to sugarcane acreage, bringing HC&S to 34,500 acres this year. Another 1,200 acres have been approved for addition to cane acreage by 1982. Eventually 95 percent of all fields will be converted to drip irrigation. The remaining fields will be furrow-irrigated, using waste water from its two mills.

The economics of drip irrigation systems has been improving since the introduction earlier in this decade. At HC&S, management estimates that a drip system depreciated over 12 years would pay for itself by the savings in cultivation costs. Weed control costs are reduced and irrigation is much more labor-efficient. For furrow irrigation, one man is required for every 175 acres while one man can take care of 700 acres a day in drip irrigation.

Pioneer Mill Co. on the leeward side of the island has also experienced a break in the long drought, and more adequate water supply is pushing up sugar production. The ditch flow rose in the early summer of 1978 and stayed at a good level since then. It has been down the past summer but at a higher level than during the past drought-stricken summers. Sugar production last year amounted to 46,178 tons, which was the low for this decade. With a better water supply and a slightly larger acreage for harvest this year, production was expected to be close to 53,000 tons. However, yield has been better than expected and the 1979 estimate has been raised to 53,700 tons. Through last September, average yield for the year was 11.81 tons of sugar per acre, almost half a ton better than originally estimated, and much better than the 1978 yield of 10.39 tons of sugar per acre. The drip-irrigated fields are yielding more than 13 tons of sugar an acre on the average, with the best fields hitting 16 tons. By the end of this year, Pioneer Mill will have around 54 percent of its fields in drip irrigation, and intends to complete conversion by 1982 or early 1983. By then more than 90 percent of the fields will be in drip. The remainder of the fields will be furrow-irrigated with waste water from the mill and sewage effluent from the County which will amount to around 3.2 million gallons daily.

Pioneer Mill's 1980 production is estimated at around 55,000 tons of sugar. Slightly over half of the fields to be harvested will be drip-irrigated acreage, and yield will likely be higher than that of 1979.

Pineapple

Pineapple production in Maui County was up in 1978 for the first time in four years, but depressed prices pushed revenues down to their lowest level in three years. Total production last year was 488,000 tons, which was 34,000 tons more than in 1977. But the value of the crop was placed at $28.3 million, down 7.8 percent from 1977.

The industry is feeling the effects of increasing world production, especially in Thailand. The Mainland market was holding firm and prices were being maintained as competing canned fruit was still in short supply. Total sales in 1979 may be slightly below last year's level.

Flowers and Nursery Products

The commercial production of flowers and nursery products is beginning to expand on Maui, and the future potential looks promising. Miscellaneous flowers and nursery products showed the largest increase last year, with receipts totaling $1.1 million, a 65 percent increase over 1977. In this category are potted chrysanthemum, poinsettia, and hydrangea, and landscape planting material. A large proportion of the potted flowers sold in Honolulu markets on special occasions are from Maui. Landscaping material required for Maui's huge land development projects was either grown in-house as at Wailea or imported from Oahu. But in the last few years, plant nurseries have sprung up on Maui and Molokai to supply landscaping plants for development projects on their islands.

Carnations for leis are another important crop on Maui and last year reached the million-dollar sales level for the first time. As Maui is the only island supplying these blossoms for leis, growers have expanded their acreage in the past year or two. Yields are high in the cool upland area of Kula where these flowers are grown in small plots of few acres each. Carnations sold as cut flowers are small in volume compared to those sold for leis, but sales last year quadrupled to $77,000.

Another flower with the potential of becoming a million-dollar crop is the protea, with Kula the dominant area as these flowers prefer an elevation of between 3,000 and 4,000 feet. Receipts last year amounted to $211,000, more than double the 1977 sales of $95,000. Protea culture is being expanded on the Big Island, but it is estimated that Kula production makes up 75 percent of the state total at the present time.

The 1979 protea harvesting season has just begun, and checks with individual growers show that they are expecting a substantial increase in the number of stems they expect to harvest this year for shipment. With a larger crop on their hands, growers may face a problem of marketing. The Protea Cooperative of Hawaii was organized a few years ago, and a packing shed was set up to do the packing, shipping, and marketing for grower members. It could not get the majority of growers to join the group, and during the past year some of the members resigned, leaving the cooperative with only about 10 percent of the growers. Nonmember growers are doing their own packing and shipping, and also the marketing. This will be more costly for individual growers and some may find it difficult to tend to their farms and handle marketing at the same time. Growers will get some aid from the State this year in promoting the protea in the islands and on the Mainland. The Department of Planning and Economic Development will provide $38,000 toward this effort which will be conducted through the growers. For this purpose the growers have formed the Protea Association of Hawaii, with more than 75 percent of the growers on Maui and the Big Island having joined the group. The State will also help the association by providing information and assisting in marketing efforts.

Europe is the largest market for proteas at the present time. Sunburst Hawaii Ltd., the largest grower in Kula, shipped the bulk of its production last year to Europe, mainly to Italy, West Germany, and Holland. It is seeking to create markets across the Mainland, because it is much cheaper to send the flowers the shorter distance. It wants to develop the Mainland as half of its market eventually. Honolulu is also targeted as a prime market for proteas.

There are two nurseries in Kula that supply seedlings to growers. Protea plants last about 12 years, and have to be replanted after that. One of these nurseries, the Olinda Vista Nursery, sells about 45,000 seedlings annually, 60 percent of which are shipped to California growers and the remainder distributed locally.

Papaya

Papaya production on Maui is winding down this year to a fraction of what it has been in the past two years with the closing down of Princess Orchards. This big producer at one time had 300 acres of orchards. It went out of business at the end of 1978, and leased the farm to Hana Tropical Fruit Corp., which has been harvesting the trees this year, and will continue to do so until harvesting becomes uneconomical within a year or two. The farm is now down to 30 acres, and eventually the land will go into sugarcane.

The harvest last year amounted to 13.2 million pounds, down from the 13.9 million pounds harvested in 1977, which was the peak year. Of last year's crop, 6.2 million pounds were marketed as fresh fruit, while the remaining 7 million pounds were processed for puree. Acreage harvested last year increased by 50 acres to 260 acres, but yield per acre dropped to 50,600 pounds from 66,400 pounds in 1977.

Fresh papaya shipments from Maui have been on the decline all year as a result of the reduced acreage. Shipments in the first nine months totaled 2.8 million pounds, a decrease of 43.5 percent from the 4.9 million pounds exported in the same period of 1978. Shipments for the entire year are estimated at around 3.5 million pounds, a sharp drop from the 6.2 million pounds marketed in 1978. Shipments in 1980 are expected to decline further to around the 3-million-pound level.

New plantings in East Maui are expected to help Maui production grow slightly in the next few years. Owners of small farm lots in the Hana area are planning to plant papaya to supply Orchards Hawaii Ltd., which will use the fruit in its puree manufacture.

Statewide, papaya production is not expected to get back to normal until around mid-1980, so supplies will continue short until then or longer. Growers in Puna who suffered major damage to their orchards during the past winter storms had to wait to assess the extent of damage before replanting to replace the losses. Planting started around midyear, so these trees will not begin bearing fruit until the middle of 1980.

Maui County Statistics

	unit	period	1974	1975	1976	1977	1978	9 mo.* 1979	% change 9 mo.* 1979/1978
Population, Resident	number	July 1	52,500	55,000	58,200	60,300	61,400p	n.a.	—
Per Capita Personal Income	dollars	total	5,467	5,952	6,507	7,209	n.a.	n.a.	—
Civilian Labor Force	number	mo.avg.	25,800	27,900	29,450	30,900	31,100	32,600p	4.5
Employment	number	mo.avg.	23,350	25,150	26,350	28,650	28,700	30,250p	4.9
Unemployment	number	mo.avg.	2,450	2,750	3,100	2,300	2,350	2,150p	−8.5
Unemployment Rate	percent	mo.avg.	9.5	9.8	10.5	7.4	7.6	6.6p	−12.0
Total Job Count[1]	number	mo.avg.	23,650	25,400	26,600	28,450	30,700	31,900p	3.6
Tax Collections	thous. $	total	31,185	37,020	43,049	47,031	54,405	51,483	18.8
Total Bank Deposits	thous.$	end per.	135,830	142,826	158,192	180,772	216,241	243,675	15.4
Debits to Demand Deposits	mil. $	total	1,072.1	1,243.3	1,426.2	1,736.4	2,246.4	2,075.8	24.3
Private Permits	thous. $	total	110,826	116,852	74,795	74,768	168,923	81,087	−29.2
Residential	thous.$	total	92,711	95,690	37,086	58,298	104,094	63,481	8.0
Single Family	no. of units	total	589	797	873	1,081	994	707	7.0
Multi-Family	no. of units	total	2,644	2,208	229	497	1,330	682	12.7
Non-Residential	thous. $	total	18,114	21,163	37,710	16,469	64,829	17,606	−68.5
Public Contracts Awarded	thous. $	total	5,959	23,075	35,296	26,863	43,564	31,107	−26.0
Federal	thous. $	total	65	1,848	4,599	10,833	2,134	56	−96.7
State	thous. $	total	3,326	10,628	13,807	7,239	25,242	24,353	0.9
County	thous. $	total	2,569	10,599	16,890	8,792	16,187	6,698	−58.6
Estimated Westbound Visitors	thous.	total	852.2	931.9	1,110.7	1,257.1	1,403.1	1,096.2p	6.2
Intended Length of Stay—Westbound	no. of days	mo. avg.	3.23	3.42	3.50	3.62	3.77	4.00p	6.7
Hotel Inventory	number	June	5,506	6,018	7,378	8,397	8,680	9,654	11.2
Hotel Occupancy	percent	mo. avg.	74.6	72.3	74.8	76.9	80.4	74.6	−8.7
Electricity Sales	mil KWH	total	293	328	368	411	446	354	6.9
Telephones in Service	number	end per.	33,180	36,142	41,196	46,417	51,316	48,945	10.5
Motor Vehicle Registration	number	total	39,201	41,766	45,858	51,228	56,376	n.a.	—
Pineapple Production, fresh equivalent	thous. tons	total	511	499	457	454	488	n.a.	—
Sugar Production, raw sugar 96°	thous. tons	total	260	261	263	265	245	199	−6.7
Diversified Agriculture[2]	mil. $	total	13.2	14.2	- 16.3	17.7	19.7	n.a.	—
Crops	mil. $	total	5.6	6.9	7.8	9.1	10.4	n.a.	—
Livestock[2]	mil. $	total	7.6	7.3	8.5	8.6	9.3	n.a.	—

p = preliminary.
n.a. = not available.

**except population (July 1), hotel inventory (June), and private permit data (8 mo.).*

[1] Refers to number of jobs rather than number of persons employed. Persons with more than one job are counted more than once.
[2] Includes estimates for milk, chickens, and eggs.